THE AMERICAN GAS LIGHT JOURNAL

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME XCI., No. 12. Whole No. 1,789. | NEW YORK, MONDAY, SEPTEMBER 20, 1909. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. H. WADELTON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

NOTICES—

Annual Meeting, Pacific Coast Gas Association..... 713

Wrinkle Department, American Gas Institute..... 714

EDITORIALS—

Briefly Told 714

*Some Notes from Abroad.

*Appliance Exhibit, National Commercial Gas Association..... 715

*The Russell Vertical Retort Bench..... 715

The Novel Use of Gas Engines for Boosting Gas Pressure in Distributing Mains..... 717

*A Spectacular Lighting Display, Poughkeepsie, N. Y..... 718

*A Calculating Chart for the Contents of Cylindrical Tanks..... 718

Address of Mr. James T. Lynn, President Michigan Gas Association..... 721

The Modern Steam Plant, by A Cheerful Idiot..... 723

High Pressure Gas for Public Lighting. 724

BUREAU OF INFORMATION, THE AMERICAN GAS INSTITUTE..... 725

Question No. 45—Answer by the Bureau.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 726

Mr. C. M. Cohn Lectures on Natural Gas, Baltimore—Albion, Neb., Gas Replaces Gasolene—Mr. A. B. Eilbeck Moves to New York—Bronx Gas and Electric Company Propose to Issue $1,500,000 in Bonds—Contented Consumers in Columbia, S. C.—South Tacoma, Wash., Wants More Gas—Mr. Francis Espy goes to Altoona, Pa.—A Contract for the Gas Bench Construction Company—Mr. R. S. Bohan in Charge at San Pedro, Cal.—Mr. O. N. Guildin Visits Valley City on Business and Pleasure—Competition at Port Jervis, N. Y.—Notable Change in a Publishing House—Brooklyn Union Declares a 3 per cent. Dividend—Improvements at Oswego, N. Y.—The Kroger Gas Coal Company Organized—Mr. Rob't N. Bruce Goes to New York—Schenectady Breaks Previous Gas Records—Robbinsdale and Columbia Heights, Minn., Want Gas—Holyoke Shows Big Gain in Electric Sendout—Marblehead, Mass., to Buy its Gas—Extensions at Taunton, Mass.—Death of Mr. H. E. Clark, Jr.—And Other Items.

The Market for Gas Securities..... 728

[NOTICE.]

Annual Meeting, Pacific Coast Gas Association.

OFFICE OF THE SECRETARY, 445 SUTTER STREET, SAN FRANCISCO, CAL., Sept. 7, 1909.

To the Members of the Pacific Coast Gas Association: I take pleasure in advising you herewith of the final arrangements that have been made for the coming convention of the Pacific Coast Gas Association, to be held at San Francisco, September 21st, 22d and 23d.

In the first place, I would respectfully call your attention to the following special report that has been unanimously adopted by your Board of Directors, whereby Mr. W. B. Cline, of Los Angeles, has been elected to the office of Vice-President, and who will preside at the coming convention of the Association, owing to the continued illness of our President-elect, Mr. George S. Colquhoun:

"Owing to the continued illness of the President, Mr. George S. Colquhoun, it becomes necessary for the Vice-President to take charge and carry the convention to a successful conclusion; but as Vice-President-elect, Mr. W. F. Boardman, had made arrangements to be absent from the State and would not be able to be in attendance at Convention, he tendered his resignation as Vice President, and in his place Mr. W. B. Cline, of Los Angeles, was placed in nomination and was unanimously declared to have been elected to that office by your Board of Directors."

The following is a list of papers to be read before the meeting, so far as known at this time, with the probability of our receiving one or two further contributions:

"President's Address," by Mr. W. B. Cline.

"Gas Distribution in San Francisco," by Mr. W. R. Morgan.

"The Public and Its Complaints," by Mr. C. L. Barrett.

"Some Results of Personal Interviews with the Dissatisfied Consumers," by Mr. John Clements.

"Damage Claims: A Modern View," by Mr. John P. Coglan.

"Underground Electric Construction," by Mr. S. J. Lisberger.

"Some Notes on Naphthaline Conditions in California," by Mr. Sherwood Grover.

"Effective Gas Lighting," by Mr. R. J. Thompson.

"Public Benefits Derived from Water Power Development in California," by Mr. John Martin.

"What I Have Accomplished with the City Fathers (an impromptu address)," by Mr. R. L. Van der Naillen.

"A Word About Gas Collections," by Mr. Homer F. Keyes.

"Methods of Education of Consumers," by Mr. Wm. Baurhyte.

"The Emergency Service of the Los Angeles Gas and Electric Corporation," by Mr. C. S. Vance.

"The Gas Exposition as a Means of Advertising," by Mr. John D. Kuster.

"New Business Methods," by Mr. T. D. Petch.

"Oil Gas Residual and How to Handle It," by Mr. R. P. Valentine.

"Wrinkles," R. L. Clarke, Editor. Experiences, R. P. Valentine, Editor.

The meeting will be held in the Assembly Hall of the new office building of the San Francisco Gas and Electric Company, No. 445 Sutter street, between Stockton and Powell streets, San Francisco, and will be called to order promptly at 10 o'clock A.M., September 21st.

Railroad Transportation.—Arrangements have been made with the Southern Pacific Company and the Santa Fe Company, whereby the members attending the Convention will be given a rate of 1½ fares for the return trip (receipt certificate plan), and which plan will be in force for the period from September 11th to the 23d, both inclusive, and the receipt certificate will be honored for the return trip from September 21st to the 25th, both inclusive. You are especially cautioned, in purchasing your ticket, to be sure and obtain from the Ticket Agent "The Receipt Certificate," and which receipt certificate, when duly countersigned by the Secretary or Assistant Secretary of the Association, will entitle you to the benefit of one-third fare trip for the return trip. In purchasing your ticket, if you fail to secure the receipt certificate, it will be your own loss, as the Railroad Companies have notified us that they will not make any reduction in the return fare without it. The receipt certificate plan will be in force from all stations in California and Reno, Nev.

Banquet.—The banquet will be held in the Colonial Ball Room, St. Francis Hotel, the evening of September 22d, at 7 P.M., and will be for the benefit of members exclusively.

Outing.—The outing will be held at Muir Woods, Thursday, September 23d, descriptive of which I am inclosing you herewith pamphlet. Members will take the 9:45 A.M. boat from San Francisco at the Sausalito Ferry, and on their arrival on the other side will take the train for Mill Valley, from which latter point a special train will convey them to Muir Woods, arriving there at 11:27 A.M. Luncheon will be served at 12 noon, and the return trip from Muir Woods will be made at 4:20 P.M., arriving in San Francisco at 6:05 P.M. This outing is for the benefit of members and their families, and tickets can be obtained from the Secretary on the day of the meeting.

As the hotel facilities in San Francisco are more than ample at this time, we have not deemed it necessary to make any special arrangements along those lines, leaving it for the members living outside of the city to arrange for their own accommodations. However, should any of the members desire special accommodations made for them, we are at your service and will be glad to give the matter our attention upon request.

Members will please fill out the inclose postal card and return it to

LIBRARY OF CONGRESS SEP 20 1909 WASHINGTON, D.C.

us at the earliest possible moment. This in order that we can make our final definite arrangements for the banquet, etc.

Owing to the fact that the convention is going to be held in San Francisco this year, and being in close proximity to the places of business of the appliance men, it has not been deemed necessary to have a novelty department. Should any of the appliance people have any special matters they desire called to the attention of members, we will be glad to make announcement of the same before the meeting.

I am inclosing you herewith bill for the current year's dues, and prompt remittance of the same will be duly appreciated.

All the necessary steps have been taken to make this our banner meeting, and we want you to be on hand to give our Vice-President, Mr. W. B. Cline, from the Southland, a royal welcome.

Remember our slogan for the Seventeenth Convention, "Altogether, first, last and all the time, for the P. C. G. A."

Yours very truly, JOHN A. BRITTON, Secretary.

[NOTICE.]

Wrinkle Department, American Gas Institute.

WRINKLE DEPARTMENT, AMERICAN GAS INSTITUTE,
OFFICE OF EDITOR, GAS OFFICE BUILDING,
DETROIT, MICH, March 12th, 1909.

To the Members, American Gas Institute: All members of the American Gas Institute are earnestly requested to forward contributions for the Wrinkle Department as soon as possible.

Your co-operation determines the success of the Department.

F. L. CROSS, Editor.

BRIEFLY TOLD.

SOME NOTES FROM ABROAD.—An American, lecturing upon the subject of "Architecture," in London, stated that he really could show few examples of good British architecture, as they had had a fire in 1664 which had burned them all down. Now, although she may not have much to show in architecture, she nevertheless has many things to interest the gas engineer. The gloom of London streets has been dissipated by thousands of lamps, both municipal and private, and of a variety which cannot be duplicated any whereby living example. Surely London is cosmopolitan in lamps as well as people. The signs of our "Great White Way" are missing, but the store fronts make up the lack. Further, the outside lamps for large part are inclosed on the street side by hoods with transparent lettering, so that they serve the double purpose of lighting the window and calling attention to the kind of wares on sale. As these lamps are usually very close to the line of vision the hoods are a welcome addition. The three illustrations going herewith show the development of public lighting by means of gas. In Fig. 1 the standard post, with single burner,

Fig. 1.—Standard Low Pressure Equipment (London.)

square lantern and white enameled reflector, is shown. In Fig. 2 we have Whitehall street by night, illuminated by upright high pressure lamps. All of the light is from the public lamps here as there are no stores. In Fig. 3 the inverted, high pressure gas lamps, suspended

Fig. 2.—High Pressure Upright Light on Whitehall Street, London.

Fig. 3.—Fleet Street High Pressure Inverted.

from the building by brackets, are shown. The large lamp in this picture is one of the many thousands in front of stores, public houses, etc. The man shown in Fig. 1 is not sitting upon his trunk, but upon one of the numerous receptacles for gravel that is spread over the pavement in bad weather. The City Fathers sent a deputation to the Continent during the past spring to investigate the subject of street lighting and wisely recommended the use of high pressure, inverted gas lamps.[1] This type has been in successful operation on Fleet street for some time. See the small lamp shown in Fig. 3. That high pressure gas lighting has a distinct field of great importance there can be no doubt, and if some of the timorous ones in America wish to have their doubts dispelled, I should advise them to obtain from Mr. F. W. Goodenough, the genial and conscientious Chief Inspector of the Gas Light and Coke Company, a copy of their booklet on "The New Victoria Station," where may be seen an installation of some 400 gas lamps, under a pressure of 50 inches, in use for two years without a hitch. Owing to a late spring, and much rain in the early summer, there was an increase in sendout in this Company, each month up to August, and none of the 500-odd men on maintenance had been laid off as is usual during the summer. In order to give some idea of the magnitude of the operations of the Company, I present the following figures, as of August 16, 1907, which have to do with the quantities supplied by the Gas Light and Coke Company, and which were furnished your correspondent through the courtesy of Mr. Goodenough:

Burners under maintenance			195,305
Public lamps			48,657
	On Hire.	Sale.	Total.
Cooking stoves	95,770	29,723	125,043
Heating "	47,496	87,173	164,669
Water heaters	3,571	1,790	5,361
	146,837	118,236	265,073

The barrier of social caste has been broken by an American in a singular way. London "Public Houses," or, as we would say, "Bars," are usually circular shape, with different rooms for the patrons of variant pedigrees and degrees of wealth; and, hanging in the center of the room, shedding its glorious, refulgent rays upon the stolid revellers is a Humphrey's lamp, Kalamazoo, U. S. A. These lamps are very popular here, and I learned that the reason was on account of the extremely low cost of maintenance, that being found in London is far less than any other lamp handled.—OWENS.

1. See page 724.

[OFFICIAL.]

Regulations Governing Installation of Exhibits, National Commercial Gas Association Appliance Exhibition, to be held in Madison Square Garden, New York City, December 14, 15, 16, 17, 18, 20 and 21, 1909.

Space will be assigned to exhibitors, as nearly as possible, in the order that applications are received. To facilitate this work, applicants for space must fill out the blank on the reverse side of this sheet and specify, by numbering from diagram, their first, second and third choice of booths, and mail same to Mr. H. B. McLean, 29 East 21st street, New York city. Spaces will be assigned October 1st, 1909. Spaces will be charged for as shown on diagram.

Exhibits must be crated and shipped (transportation charges prepaid) direct to Mr. H. B. McLean, 29 East 21st, New York city.

Exhibits must reach New York not later than December 5th, and notice of shipment should be mailed when goods go forward. Upon arrival of exhibit in New York, the committee will take charge of goods, see that they are carefully unpacked and installed and the necessary gas connections made.

The exhibit must then remain in place intact until the close of the exhibition, when the Association will take it down, recrate or repack it and ship same in accordance with instructions furnished. To facilitate this work all crates should be made exceptionally strong and durable and should be screwed (not nailed) together.

Exhibitors should furnish instructions as to arrangement of exhibit and designate location of appliances, also specify the appliances they desire connected for gas. Gas for all ordinary exhibition purposes will be supplied without cost to the exhibitor. Exhibitors will specify the maximum amount of gas they will use per hour.

The necessary spaces for gas engines and water heaters will be reserved at the Fourth avenue end of the Garden, where there are ample water and drainage facilities for working exhibits.

The exhibition spaces on the main floor will be slightly elevated and divided as shown on plan. The dimensions of spaces are 7 feet 6 inches by 12 feet.

All decorations for the garden will be installed by the Association – no further signs or decorations, posts or nails will be allowed.

Advertising matter, signs, etc., must be kept below the top of posts and within the booth. Permission will be granted for the erection of pipe structures to properly display gas arc lights and hanging gas fixtures, but the limit in height for such structures shall be 15 feet. Such pipe structures must rest on the floor of the booth and must be supplied by the exhibitor complete ready for gas connections.

Exhibitors will be supplied with uniform signs, giving name of exhibitor, to be suspended as directed by the committee. No other large signs will be permitted.

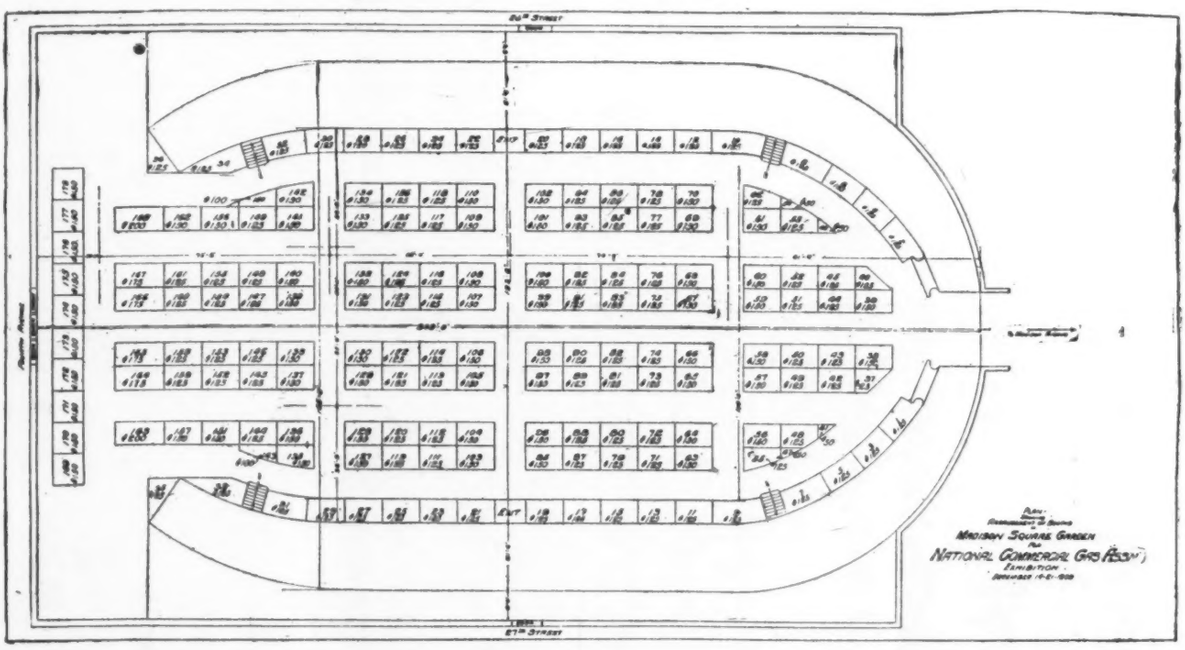
The building will be open, and the public admitted, between 4 o'clock, P.M. and 11 o'clock, P.M., on December 15th and 16th, and between 11 A.M. and 11 P.M. on December 17th, 18th, 20th and 21st. Subletting of spaces will not be permitted. Each exhibitor must sign an application for space as per reverse side of this sheet. Watchmen will be supplied and competent men will be employed and every reasonable precaution will be taken, but the Association will not assume liability for breakage in transit, installation or handling before, during or after the exhibits, or for the safety of exhibits.

Tickets of admission to the building will be 25 cents each. Every exhibitor will be allowed 10 tickets for each dollar he pays for space. Tickets will also be distributed freely by the gas companies in the surrounding territory. Publicity matter and plan of distribution must be submitted to and approved by the Exhibition Committee.

The Russell Vertical Retort Bench.

On August 10th, 1909, United States Letters Patent (No. 930,494) were granted to Mr. Daniel R. Russell, of St. Louis, Mo., for new and useful designs in connection with vertical retort benches. Using the words of the specification:

The object of the invention is to provide improved and simplified



Floor Plan.

means by which the heating of the various parts of the retorts can be independently regulated so that the highest temperature may be had at the center or at either end of the retort.

In the accompanying drawings, which illustrate one form of retort bench, made in accordance with the invention, Fig. 1 is a vertical central section; Fig. 2 is a vertical section on the line 2—2 of Fig. 3; Fig. 3 is a horizontal section on the line 3—3 of Fig. 4; and Figs. 4 and 5 are vertical cross sections on the lines 4—4 and 5—5 respectively of Fig. 3. Like marks of reference refer to similar parts in the several views of the drawings.

The retort bench consists of a front portion 10 and a rear portion 11, the rear portion being supported by framework 12. Formed in the lower part of the front portion 10 is a furnace 13 for generating furnace gas. This furnace 13 is provided with the usual flue 14, grate 15 and ashpan 16. Communicating with the furnace 13 is a flue 17 for conducting the furnace gases to the various heating or combustion chambers 18. The flue 17 communicates with the heating or combustion chambers 18, by means of the passages 19, as best shown in Figs. 1 and 3. The heating chambers 18 are 6 in number and are formed in pairs by means of passages 20, as best shown in Fig. 2. Each pair of chambers thus constitutes a set which are connected together, but which are entirely independent of the other sets. Passing through the various chambers 18 are vertical retorts 21, which, in the form of furnace shown in the drawings, are 4 in number.

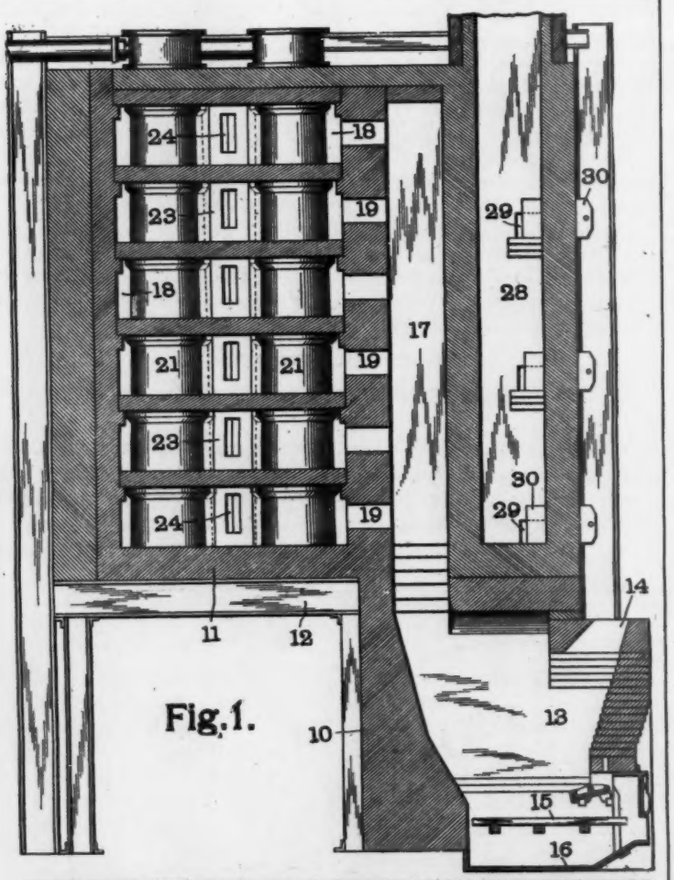


Fig.1.

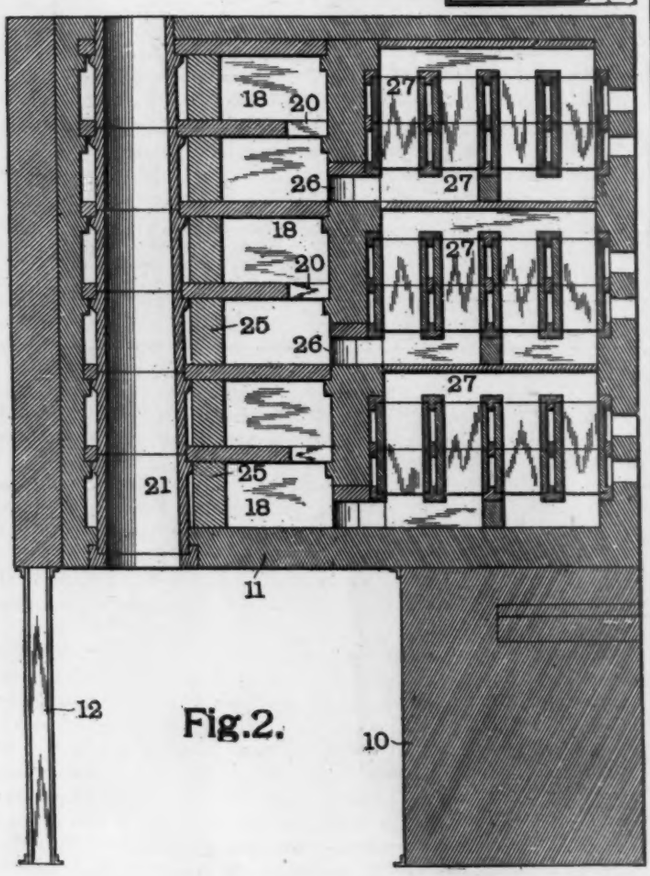


Fig.2.

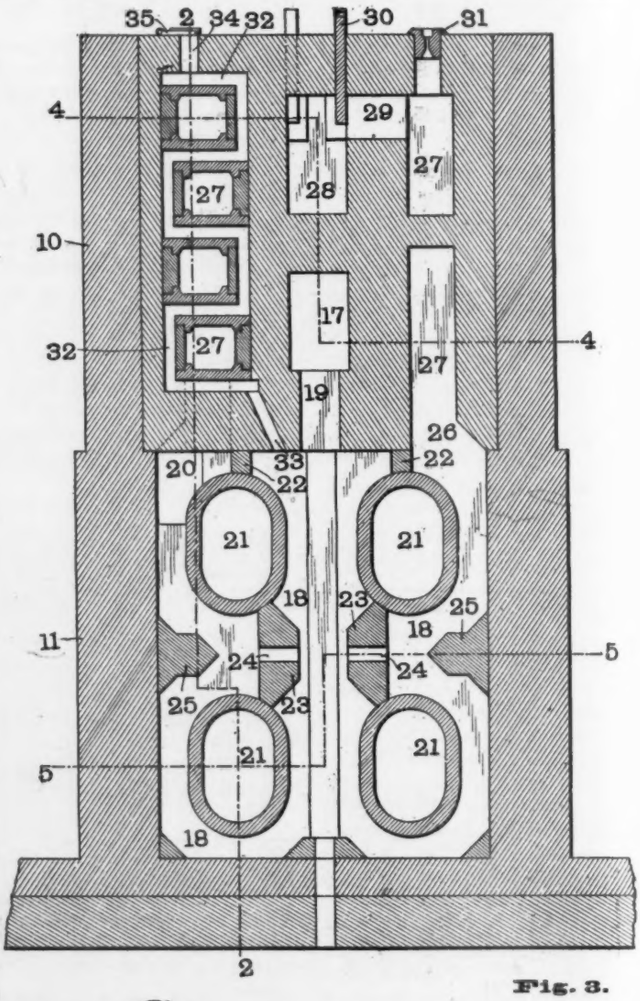
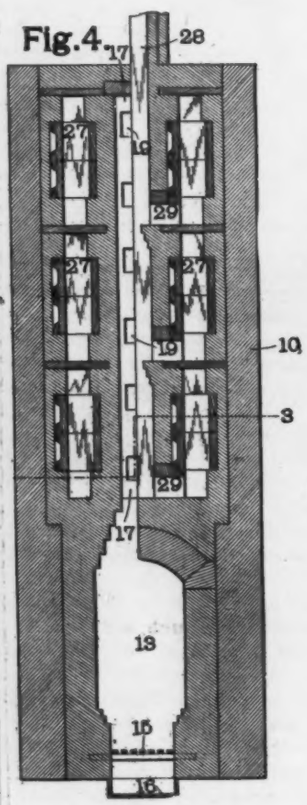
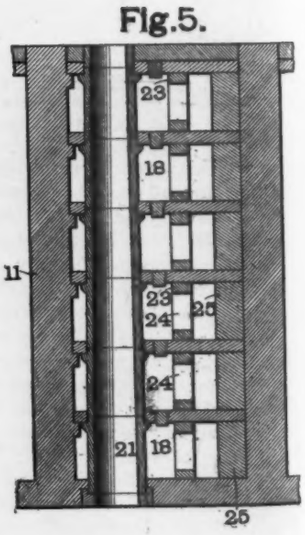


Fig. 3.





In order to insure the circulation of the heated gases around the retorts 21 each of the chambers 18 is provided with a pair of short baffle-walls 22 connecting the front pair of retorts with the front portion 11 of the furnace, a pair of baffle-walls 23 connecting the front and rear retorts and provided with passages 24, and also with a pair of inwardly projecting baffle-walls 25. While each set of combustion

chambers is thus provided with two gas inlets, but a single outlet is provided for the gases from the two chambers constituting a set. This outlet 26 communicates with a set of recuperator flues 27, as best shown in Fig. 2. The sets of recuperator flues are, therefore, three in number, one for each set of heating chambers. The gases, after passing through the recuperator flues 27 enter the chimney 28 through a passage 29. Each of the passages 29 is provided with a valve or damper 30 by means of which the passage of the gases to the chimney is regulated, thus indirectly regulating the passage of gases from the flue 17 to the two corresponding heating chambers. The recuperator flues 27 may be provided with the usual stoppers 31 for giving access thereto.

In order to supply heated secondary air to the various combustion chambers, each of the sets of recuperator flues 27 is provided with a pair of sinuous passages 32 communicating at one end through a passage 33 with one of the combustion chambers and at the other through a passage 34 with the atmosphere. The passage 34 is controlled by means of a damper 35 so that the supply of secondary air may be regulated to correspond with the amount of gases entering the heating chamber.

In the operation of the retort bench, the retorts are first charged in the usual manner and the furnace 13 supplied with fuel. The heated gases from the furnace 13 pass up through the flue 17 and into the various heating chambers 18 through the passages 19. The quantity of gases entering each set of heating chambers, however, can be independently regulated by means of the valves or chambers 30, as the gases will not enter the heating or combustion chambers unless a corresponding amount of the products of combustion can escape through the openings 29 into the chimney 28. At the same time a supply of secondary air to each of the combustion chambers can be independently regulated by means of the dampers 35. In this way perfect control is obtained by the heating of the retorts throughout their entire length, and at the same time the construction is simple and not liable to get out of order.

Having thus described the invention, Mr. Russell makes the following claims:

1. The combination with a retort bench, of a vertical retort in said bench, said bench being provided with a plurality of heating chambers surrounding said retort, said chambers being arranged in sets separated from each other but having the chambers of each set connected, air and gas inlets for each chamber and a common outlet for the chambers of each set.

2. The combination with a retort bench, of a vertical retort in said bench, said bench being provided with a plurality of heating chambers surrounding said retort, said chambers being arranged in sets separated from each other but having the chambers of each set connected, air and gas inlets for each chamber, a common outlet for the chambers of each set, and means for independently regulating each set of chambers.

3. The combination with a retort bench, of a vertical retort in said bench, said bench being provided with a plurality of heating chambers surrronding said retort, said chambers being arranged in sets separated from each other, but having the chambers of each set connected, air and gas inlets for each chamber, a common outlet for the chambers of each set, and a valve in each of said outlets for independently regulating each set of chambers.

4. The combination with a retort bench, of a plurality of vertical retorts in said bench, said bench being provided with a plurality of heating chambers surrounding said retort, baffle-walls in said chambers to guide the products of combustion therethrough, said chambers being arranged in sets separated from each other, but having the chambers of each set connected, air and gas inlets for each chamber, and a common outlet for the chambers of each set.

5. The combination with a retort bench, of a plurality of vertical retorts in said bench, said bench being provided with a plurality of heating chambers surrounding said retorts, baffle-walls in said chambers to guide the products of combustion therethrough, said chambers being arranged in sets separated from each other, but having the chambers of each set connected, air and gas inlets for each chamber, a common outlet for the chambers of each set, and means for independently regulating each set of chambers.

6. The combination with a retort bench, of a plurality of vertical retorts in said bench, said bench being provided with a plurality of heating chambers surrounding said retorts, baffle-walls in said chambers to guide the products of combustion there through, said chambers being arranged in sets separated from each other but having the chambers of each set connected, air and gas inlets for each chamber, a common outlet for the chambers of each set, and a valve in said outlet for independently regulating each set of chambers.

7. The combination with a retort bench, of a vertical retort in said bench, said bench being provided with a plurality of heating chambers surrounding said retort, said chambers being arranged in sets, said sets being separated from each other, but the chambers of each set being connected, a gas inlet for each heating chamber, a common outlet for the chambers of each set, a series of recuperator flues for each outlet, and secondary air inlets heated by said recuperator flues for supplying air to each heating chamber.

8. The combination with a retort bench, of a vertical retort in said bench, said bench being provided with a plurality of heating chambers surrounding said retort, said chambers being arranged in sets, said sets being separated from each other, but the chambers of each set being connected, a gas inlet for each chamber, a common outlet for the chambers of each set, a valve in said outlet for independently regulating each set of chambers, a series of recuperator flues for each outlet, and secondary air inlets heated by said recuperator flues for supplying air to each of said heating chambers.

9. The combination with a retort bench, of a vertical retort in said bench, said bench being provided with a plurality of heating chambers surrounding said retort, said chambers being arranged in sets, said sets being separated from each other, but the chambers of each set being connected, a gas inlet for each heating chamber, an outlet for each set of chambers, a valve in each of said outlets for independently regulating each set of chambers, a series of recuperator flues for each outlet, secondary air inlets heated by said recuperator flues for supplying air to each heating chamber, and a valve for each of said secondary inlets.

10. The combination with a retort bench, of a vertical retort in said bench, said bench being provided with a plurality of heating chambers surrounding said retort, said chambers being arranged in sets, said sets being separated from each other but the chambers of each set being connected, a furnace, a gas inlet leading from each of said heating chambers to said furnace, a secondary air supply for each of said chambers, an outlet for each set of chambers, and a valve in each of said outlets to independently control the supply of gas from said furnace to each set of heating chambers.

The Novel Use of Gas Engines for Boosting Gas Pressure in Distributing Mains.

An important installation of Westinghouse gas engines for boosting the pressure in its illuminating gas mains, has recently been contracted for by the Public Service Corporation of New Jersey. At its Hoboken and Passaic plants, four Westinghouse, vertical, 13-inch by 12-inch, gas engines, equipped with special regulating mechanism, will be employed to drive direct-connected, Root blowers, delivering gas at pressures varying from ¾ pound to 4 pounds per square inch, as desired.

The delivery of gas by the blowers is automatically made to conform to the demand on the gas lines, by increasing the speed of the engines as the pressure in the mains tends to fall. To accomplish this, a special controlling valve has been added to the engine equipment, which throttles the fuel admitted to the engine, adjusting its speed between 290 and 125 revolutions per minute, as the demand for gas varies. The controlling valve is operated by a piston, to which pressure from the gasholder line is admitted, and which moves against the compression of a helical spring to close the fuel valve as the line pressure rises. The controlling valve is fitted with a positive stop, so adjusted that, even though the line pressure reaches its full value, the fuel valve cannot close beyond a point where the engine will continue to turn over on light load, thus avoiding the necessity of restarting the engine when the blower pressure is again required. While it is estimated that the minimum demand on the pipe lines will probably absorb the delivery of the blower at its lowest speed (125 revolutions per minute), any possible abnormal rise in pressure is prevented by the provision of relief valves which automatically open a by-pass around the blower, enabling the engine to run light while performing no other work than circulating the gas in its local circuit. A standard governor device has also been supplied with these engines, designed with considerable play or backlash, so that the governor does not control the gas admission until the engine speed exceeds 250 revolutions per minute. Above this, the governor travel takes up the backlash, throttling the gas and preventing any possibility of

overspeeding in case the pressure in the transmission line should suddenly be relieved.

The location of the boosting equipment dictated the use of a magnet generator for ignition current, driven from the main engines. The feature of obtaining approximately constant speed for the ignition current generator run from an engine of widely varying speed, is unique. A Holtzer-Cabot WS magneto, equipped with a governor pulley, is employed. The magneto, designed to run at 2,000 to 2,500 revolutions per minute, is driven by friction contact with the side face of the flywheel rim, which varies in speed from 125 to 290 revolutions per minute, the governor acting to withdraw the pulley momentarily when its speed exceeds normal rating, so that, whatever the speed of the engine, the magneto runs at approximately constant speed.

The engines are each of 90 brake horse power capacity, and use illuminating gas from the supply lines, with a heat value of approximately 600 B.T.U. per cubic foot. The engines are direct connected to the blowers through rope flexible couplings.

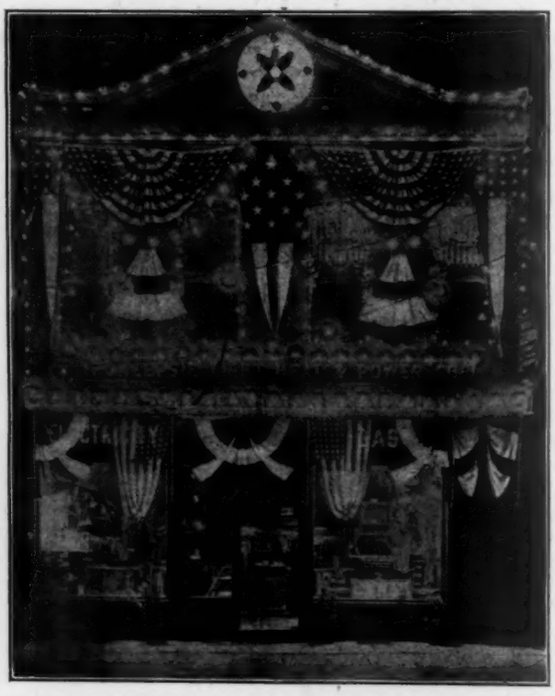
A Westinghouse, single-phase alternating-current motor drives a 3-inch by 4-inch, belted, air-compressor, supplying storage tanks from which air is taken to start the engines.

The value of this application of gas engines for boosting the pressure in gas transmission pipes is now quite fully realized, and boosting plants are being more extensively used, which means the use of smaller pipes maintained and the obtaining of increased transmission capacities.

With a gas "booster," as previously described, existing distribution systems severely overtaxed for capacity can be made to adequately meet a large increase in gas consumption without further expense in piping.

A Spectacular Lighting Display, Poughkeepsie, N. Y.

In the week ended August 21st the annual convention of the Volunteer Firemen's Association of the State of New York, was held



Display by the Poughkeepsie Light, Heat and Power Company.

in Poughkeepsie. It is not, we believe, saying too much respecting it when one says that it was notable for many things in the history of the organization's annual trysts. Not the least notable of which was the generally extravagant illumination of the old city, famous as the home of Vassar College, the working place of the late Mr. H. P. Allen, of the Allen-Harris process fame, and the country home of another Allen, whose proprietorship for 25 years or more of the old Astor House in this city caused him to be well known amongst and by the gas men of this and other States—in fact, the Astor House was the first large hotel in this country to use gas for cooking in its kitchens, and on a large scale. To come back, however, to Poughkeepsie proper and the firemen. The usually matter-of-fact, staid Dutch city, nestling in the foothills of the Dutchess county mountains, was absolutely a blaze of light in so far as goodly lengths of Main and Market streets, were concerned. Naturally the "Hook and Ladder House" of Wyndorsee fame was "lamped" from top to bottom; in fact, all the public buildings were draped and illuminated in fashion unstinted.

The illumination and decorative effects put forth by the Poughkeepsie Light, Heat and Power Company, are well shown in the illustration, the main credit for the arranging of which should likely go to Mr. G. A. Voorhees. Over 25,000 lamps were employed on this extra illuminative work.

A Calculating Chart for the Contents of Cylindrical Tanks.[1]

By Thomas B. Morley, B.Sc., Glasgow University.

Owing to the new budget tax on petrol, manufacturers of petrol, gasolene, etc., are now under the necessity of periodically taking records of their stock, not only of petrol, but also of the intermediate oils and naphthas from the distillation of which motor spirit is obtained. These liquids are usually stored in cylindrical tanks lying horizontally, and it has thus become necessary to be able to determine very frequently the quantity of liquid filling a tank up to any level. The calculation of such volumes by the ordinary rules of mensuration is very laborious, and this, with the frequency of the calculations, leads to a demand for a rapid, special means of determination of the volumes. Some assistance may be obtained by reference to mensuration tables, such as those to be found in most engineers' pocket-books or in books of mathematical tables. The writer has, however, while still starting from these tables in the first place, gone a step further and devised a chart by means of which the volume of liquid filling a cylindrical tank to any level may be very readily found without any arithmetical calculation at all, and without further recourse to the tables than that necessary in the construction of the chart.

Let D be the diameter of the tank, Fig. 1, and H the depth of liquid; then the volume of liquid is obtained by multiplying the area of the segment $A\ B\ C$ by the length of the cylinder. It is in the calculation of the area of the segment that the chief difficulty is met with. To calculate the area by the aid of the usual tables or pocket-books, the process is as follows:

The quotient $H \div D$ is found; this is the depth of a segment of a circle of unit diameter, and similar to ABC. The area of this segment (equal to x, say) is given in the tables for a series of values of $H \div D$. Then, since similar areas are proportional to the squares of corresponding dimensions, the area of the segment required is equal to $x \times D^2$. The primary object of the chart is to enable the result of these three operations—viz., the division of H by D, the finding the corresponding value of x, and the multiplication of x by D^2—to be rapidly and easily performed, although it will be seen that the chart proceeds further in obtaining not only this area, but also the required volume of liquid.

Fig. 2 shows the chart, and the dotted lines show two examples of its use. Suppose H is given as 15 inches, D 60 inches, and the length l 10 feet, or 120 inches, then from the point marked 15 on the bottom scale follow the vertical to the line marked $D = 60$; from the intersection follow the horizontal to the curved line, then the vertical to the line $D = 60$ again, and then the horizontal to the line marked $l = 120$ and then the vertical to the top scale. The reading at the point so found gives the volume in gallons of the liquid in the tank. In this example, which is shown by one of the two sets of dotted lines in Fig. 2, the volume is read off as 240 gallons; arithmetical calculation gives the result as 239 gallons, the difference being thus only 0.5 per cent.

The chart is a logarithmic one, and before describing its construction an explanation of logarithmic charts in general is necessary. Fig. 3 shows in outline a chart for the division of two quantities A and B, say, *i. e.*, for finding $C = A \div B$. Consider first not A, B and C, but $a = \log. A$, $b = \log. B$, and $c = \log. C$. Along the axes O X and O Y are marked off equal uniform scales of a and c, and equidistant lines at 45° are drawn marked with values of b, the scale of values of b, measured parallel to either axes, being the same as that of a or c. From the arrangement of the diagram it is obvious

1. *Engineering.*

that if any lines $K\,L$ and $L\,M$ be drawn parallel to the axes, then the number on the c scale at M will be the difference of the value of a at K and the value of b on the line through L; *i. e.*, by following the lines $K\,L$, $L\,M$ we find at M $c = a - b$. Now besides the scales of a and c are also marked scales of the corresponding values of A and C, and on the diagonals are marked values of B. The scales of A, C, etc., are termed logarithmic scales and are similar to those marked on the ordinary slide rule. Since $c = a - b$, we have log. C = log. A — log. B, and hence C = A ÷ B, so that by using the A, B and C scales the diagram may be employed to find C, the result of the division of A by B. In a similar manner, if the order of the numbers on the scales be reversed, the diagram enables addition of logarithms or multiplication of numbers to be performed. Actually, only the scales of A, B, C need be marked, those of a, b and c being unnecessary. Fig. 3 thus shows the type of chart for simple multiplication or division. In order to deal with squares, cubes or other powers, the sloping lines may have their inclination altered or, preferably, their spacing may be varied. As an illustration, Fig. 4 shows a chart for finding $S = P \times R^2$. Equal scales of p = log. P, s = log. S, and logarithmic scales of P and S are marked as in the previous case, and diagonals are drawn and marked with values of q, of $r = q \div 2$, and of R = antilog. r as shown, the scale of q (parallel to the axes) being the same as that of p or s. As in the previous diagram, by following the lines $K\,L$, $L\,M$ we obtain at M the value of $s = p + q$. But $q = 2r$, so that $s = p + 2r$, and therefore log. S = log. P + 2 log. R, or $S = P \times R^2$. The scale of R is twice as open as that of P or S; similarly, for a quantity raised to any power n, its scale will be n times as open as that of quantities which appear to the first power.

The chart for the contents of cylindrical tanks is arranged on the same principle, and the method of its construction is fully illustrated in Fig. 5. The scales on $A\,B$, $A'B'$, $A\,C$ and the diagonals marked with the values of D correspond to Fig. 3, and enable the division of H by D to be performed; $A\,C$ is the scale of values of the log. of the quotient H ÷ D. The next step is to relate the values of H ÷ D to those of x (the area of the segment of the unit circle). To the columns of (H ÷ D) and x given in mathematical tables, are added columns of log. (H ÷ D) and log. x as follows:[1]

H ÷ D.	x.	Log. (H ÷ D).	Log. x.
0.1	0.0409	$\bar{1}.0$	$\bar{2}.6116$
0.2	0.1118	$\bar{1}.3010$	$\bar{1}.0483$
0.3	0.1982	$\bar{1}.4771$	$\bar{1}\ 2971$
etc.	etc.	etc.	etc.

It may be noted here that the tables usually give values up to H ÷ D = 0.5 only. The value of x for H ÷ D = 0.7, for example, is found as follows:

In the unit circle the height of the segment required is 0.7, therefore the height of the remaining segment is 0.3, the corresponding area is 0.1982 from the table, hence the area of the required segment is the area of the circle less 0.1982; *i. e.*, the area is 0.7854 — 0.1982 = 0.5872. A scale of volues of log. x over the range required is set off along $D\,E$, and it is such that if 1 on the scale $A\,B$ is represented by a length L, then 1 on the scale $D\,E$ is represented by L ÷ 2. The reason for this will be apparent later on. Now from the scale of log. x and log. (H ÷ D), corresponding values given in the table are plotted, and the curve $M\,N$ so obtained. Let the point P represent the given value of H, draw $P\,Q$ to the line for the value of D, then R represents the result of the division of H by D, but S is the corresponding point on the curve, so that T, vertically below S, gives the value of log. x (and hence of x also if required). The next step is to multiply x by D^2. We have already a set of diagonals for values of D, and also a scale of log. x, and since the scale of log. x was chosen one-half that of log. D, the diagram is suited for multiplying x by D^2, as in Fig. 4. This multiplication is shown by the lines $T\,U$, $U\,V$, and the scale $F\,G$ gives values of $A = x \times D^2$; *i. e.*, A is the area of the segment $A\,B\,C$ of Fig. 1. To obtain the volume of the tank contents, A must be multiplied by l—the length of the tank. This is effected by combining the scale of A with the diagonals for values of l, as shown by the lines $V\,W$, $W\,Z$, so that on the upper scale $J\,H$ the volume V is obtained. The complete determination of the volume from the three given quantities H, D, and l, is therefore effected by following lines such as $P\,Q$, $Q\,S$, $S\,U$, $U\,W$, $W\,Z$.

The location of the various scales, and the determination of the proper order of the numbers upon them, is best performed by working out the relationships between simple numbers like 100, 10 etc. For example, in Fig. 5, R is the point on the left vertical scale corresponding to Q (where $D = 100$) and P (where $H = 10$), therefore R represents H ÷ D = 0.1 or log. (H ÷ D) = 1.0. Similarly, A corresponds to D = 100 and H = 100; *i. e.*, H ÷ D = 1, or log. (H ÷ D) = 0. To fix the scale of A ($= x \times D^2$), V' on this scale corresponds to log. x = 1.0 (or x = 0.1) and D = 100, therefore V' represents A = $x \times D^2 = 0.1 \times 100 \times 100 = 1{,}000$. Similarly V'' represents A = $0.01 \times 100 \times 100 = 100$.

For the volume scale, if A = 100 square inches and l = 100 inches, then V = 10,000 cubic inches, so that Z'' which corresponds to those values is marked 10,000, and the scale $H\,J$ is simply a copy of that on $F'G'$. To give V in gallons, 10,000 cubic inches = 36.1 gallons; the point Z'' is then marked 36.1 on $L\,K$, the scale of gallons, and the logarithmic scale $L\,K$ is the same as $H\,J$, but displaced until the point 36.1 coincides with Z'.

On the completed chart, only the scales of actual quantities need appear (Fig 2); that of the areas may be of use and can be added if desired. For the sake of clearness Fig. 2 is not fully divided; for actual use, however, the chart should be drawn to a considerable scale and more fully divided. The logarithmic scales may be copied from those of a slide rule, either directly or by means of proportional compasses according to the size of the diagram. The use of squared paper also facilitates the work of setting out the chart.

The dotted lines shown in Fig. 2 should be drawn, as they serve in place of any more detailed instructions for the use of the chart, and enable it to be used by anyone quite unskilled in mathematical calculations.

Frequently the tanks used for storing liquids have hemispherical ends, and in such cases the volume of liquid contained in the end portions must be added to that contained in the cylindrical part in order to find the total contents of the tank.

Fig. 6 shows a chart, by means of which the volume contained in the ends may be found. It is designed and constructed on a method very similar to that followed in the former chart (Fig. 2).

The two hemispherical ends of the tank together form a sphere, so that the volume of liquid in the ends forms a segment of a sphere. Then, if D be the diameter of the sphere, and H the depth of the segment, the volume of the segment is $\frac{\pi}{6}\,H^2\,(3\,D - 2\,H$. This quantity may be written

$$\frac{\pi}{6}\,D^3\left\{3\left(\frac{H}{D}\right)^2 - 2\left(\frac{H}{D}\right)^3\right\}$$

$$= \frac{\pi}{6}\,D^3\,(3\,n^2 - 2\,n^3). \qquad \text{where } n = \frac{H}{D}$$

$$= \frac{\pi}{6}\,D^3\,k, \qquad \text{where } k = \sqrt{(3\,n^2 - 2n^3)}.$$

Then, as in the former case, for the area of a circular segment, the determination of the volume of the spherical segment may be effected by three operations—viz., the division of H by D, giving n; the finding the corresponding value of k; and the multiplication of k by $\frac{\pi}{6}D^3$.

In Fig. 6, the horizontal logarithmic scale of values of H and the diagonal for values of D are identical with those representing H and D in Fig. 2, and enable the division of H by D to be performed in the same way. Now, a table of values of $n = H \div D$, and $k = \sqrt{(3n^2 - 2n^3)}$ and of log. n and log. k is drawn up (see appendix). From the corresponding values of log. n (correctly placed on the vertical scale in relation to the H and D values) and log. k the curved line on Fig. 6 is plotted similarly to the line $M\,N$ on Fig. 5; but in this case the scale of values of log. k is chosen one-third that of log. n or log. H, so that the diagonals already drawn for values of D can be combined in the usual way with the k values to give the product $k \times D^3$. The scale of values of the product $k\,D^3$ will be the same as that of k, so that on the right-hand vertical scale of volumes the distance from 10 to 100, or 100 to 1,000, will be one-third the distance from 10 to 100 on the horizontal scale of H. The temporary scales employed in the construction of the chart are similar to those of Fig. 5. The product $k\,D^3$ has to be multiplied by $\frac{\pi}{6}$ to give the volume in cubic inches, H and D being in inches, and by yet another constant to give the volume in gallons. The scale of volumes in gallons is best located by calculating independently the volume for a few values of H and D, and

1. See Appendix.

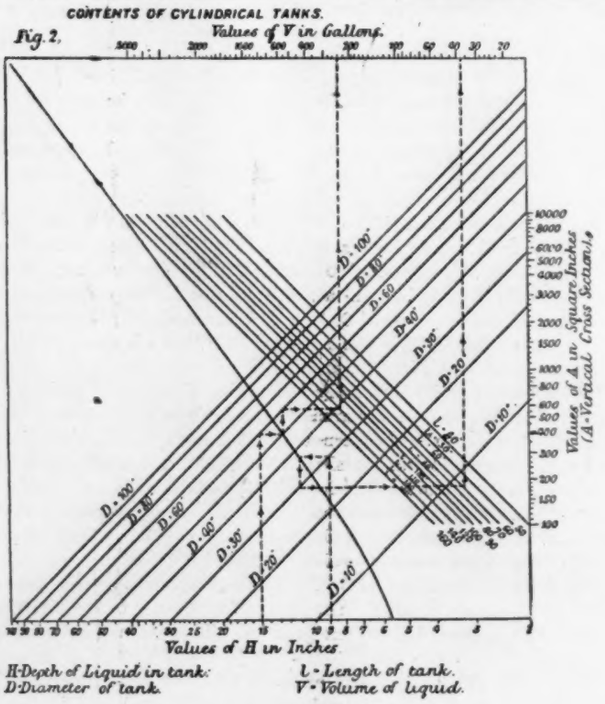

CONTENTS OF CYLINDRICAL TANKS.
Values of V in Gallons.
Values of A in Square Inches (A-Vertical Cross Section)
Values of H in Inches
H-Depth of Liquid in tank.
D-Diameter of tank.
L-Length of tank.
V-Volume of liquid.

Fig. 2.

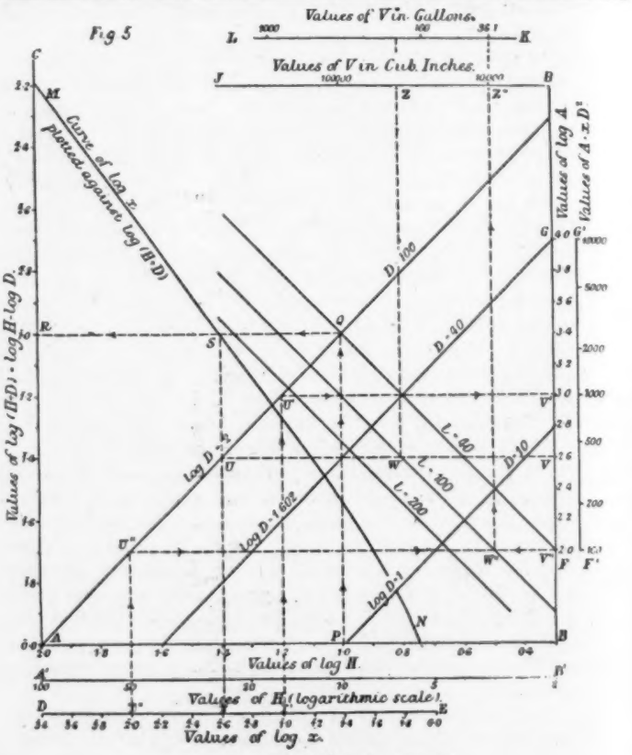

Values of V in Gallons.
Values of V in Cub. Inches.
Curve of log x plotted against log (H-D)
Values of log (H-D) - log H - log D.
Values of log A
Values of A÷D²
Values of log H.
Values of H (logarithmic scale)
Values of log x.

Fig. 5

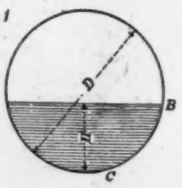


Fig. 1

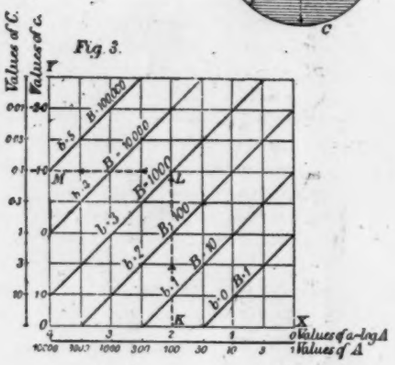


Fig. 3.

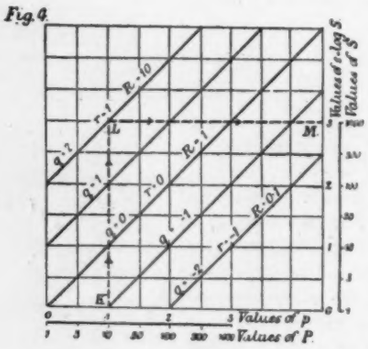


Fig. 4.

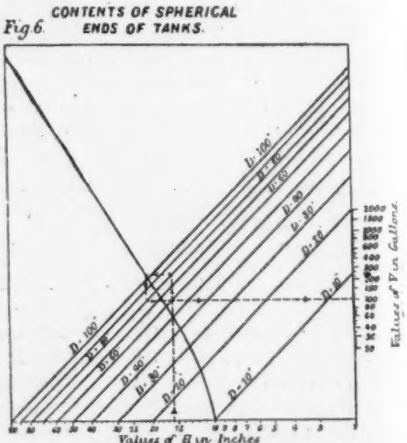

CONTENTS OF SPHERICAL ENDS OF TANKS.
Values of V in Gallons.
Values of H in Inches
D-Diameter of Tank. H-Depth of Liquid in Tank.
V-Volume of Liquid contained in the two hemi-spherical ends.

Fig. 6.

APPENDIX.

Table of Log (H ÷ D) and Log x for Curve MN (Fig. 5.)

H ÷ D.	x.	Log. (H ÷ D.)	Log. x.	H ÷ D.	x.	Log. (H ÷ D.)	Log. x.
0.02	0.003749	$\bar{2}$.3010	$\bar{3}$.5739	0.50	0.3927	$\bar{1}$.6990	$\bar{1}$.5943
0.04	0.01054	$\bar{2}$.6021	$\bar{2}$.0229	0.55	0.4426	$\bar{1}$.7404	$\bar{1}$.6460
0.06	0.01924	$\bar{2}$.7782	$\bar{2}$.2842	0.60	0.4916	$\bar{1}$.7782	$\bar{1}$.6916
0.08	0.02943	$\bar{2}$.9031	$\bar{2}$.4687	0.65	0.5404	$\bar{1}$.8129	$\bar{1}$.7327
0.10	0.04087	$\bar{1}$.0000	$\bar{2}$.6116	0.70	0.5872	$\bar{1}$.8451	$\bar{1}$.7687
0.15	0.07387	$\bar{1}$.1761	$\bar{2}$.8685	0.75	0.6319	$\bar{1}$.8751	$\bar{1}$.8006
0.20	0.1118	$\bar{1}$.3010	$\bar{1}$.0483	0.80	0.6736	$\bar{1}$.9031	$\bar{1}$.8284
0.25	0.1535	$\bar{1}$.3979	$\bar{1}$.1861	0.85	0.7115	$\bar{1}$.9294	$\bar{1}$.8522
0.30	0.1982	$\bar{1}$.4771	$\bar{1}$.2971	0.90	0.7445	$\bar{1}$.9542	$\bar{1}$.8719
0.35	0.2450	$\bar{1}$.5441	$\bar{1}$.3892	0.95	0.7707	$\bar{1}$.9777	$\bar{1}$.8869
0.40	0.2934	$\bar{1}$.6021	$\bar{1}$.4675	1.00	0.7854	....	$\bar{1}$.8951
0.45	0.3428	$\bar{1}$.6532	$\bar{1}$.5350	....	....	....	....

Table of Log n and Log k for Curve on Fig. 6.

n.	k.	Log. n.	Log. k.
0.02	0.001184	$\bar{2}$.3010	$\bar{3}$.0734
0 03	0.002646	$\bar{2}$.4771	$\bar{3}$.4226
0.04	0.004672	$\bar{2}$.6021	$\bar{3}$.6695
0.05	0.00725	$\bar{2}$.6990	$\bar{3}$.8603
0.06	0.01037	$\bar{2}$.7782	$\bar{2}$.0157
0.08	0.01818	$\bar{2}$.9031	$\bar{2}$.2595
0.10	0.0280	$\bar{1}$.0000	$\bar{2}$.4472
0.14	0.05331	$\bar{1}$.1461	$\bar{2}$.7268
0.20	0.1040	$\bar{1}$.3010	$\bar{1}$.0170
0.30	0.2160	$\bar{1}$.4771	$\bar{1}$.3345
0.40	0.3520	$\bar{1}$.6021	$\bar{1}$.5465
0.50	0.5000	$\bar{1}$.6990	$\bar{1}$.6990
0.60	0.6480	$\bar{1}$.7782	$\bar{1}$.8116
0.8)	0.8960	$\bar{1}$.9031	$\bar{1}$.9523
1 00	1.00	. ..	....

marking the scale with these results, and then displacing the scale of $k D^3$ to coincide.

Fig. 6 shows the completed chart (not fully divided, however), and the dotted lines indicate the manner in which the volume is found from the given values of D and H.

Since this chart only differs from that for cylindrical volumes (Fig. 2) by the curved line and the scale of volumes at the right, the two charts may be superposed if desired; thus will be obtained on one sheet a graphical means of readily finding the volume of the contents of cylindrical tanks with either flat or hemispherical ends, filled with liquid to any depth.

For use, the chart (or charts) should be mounted on a drawing board, and the lines for any calculations, such as those shown dotted, drawn by means of tee square and set-square upon tracing-paper pinned over the chart. A peculiar feature of logarithmic charts is that the percentage accuracy of the results is the same for all values of the quantities concerned, whether small or large, provided, of course, that the various scales and diagonals are accurately set down.

Address of President James T. Lynn, on the Occasion of the Seventeenth Annual Meeting, Michigan Gas Association.

When arrangements for this convention were being discussed, it so happened that the issue of local option versus regulation was also being considered in the State. We thought that possibly some members of this Association might favor prohibition while others might lean towards regulation; in any case, it was up to us to be extremely careful so that no one would be offended and all might be pleased. A brilliant idea struck us! Why not a trip on a "Water Wagon," under strict regulation? Both sides would thus be favored—neither would be discriminated against. This suggestion took like wildfire, so here we are on the "Water Wagon" St. Ignace, with several days of pleasure and real enjoyment ahead, and plenty of time to devote to the more serious side of our affairs.

It is the custom—and a wise one too—that the retiring President of your Association shall present his views on certain matters affecting the interests of our members, and point out as well what he considers to be most important for your careful consideration. It has also been wisely decreed by custom that other members of our Association shall present to you the result of their researches on particular features of our business. I may add, in passing, that this part of our entertainment has been carefully prepared, and the members of the Michigan Gas Association are indeed fortunate in the selection of such able and intelligent members who are on the programme. My own talk, however, will be on other matters, mostly economic, in which I will present views on certain important movements affecting our interests.

Our Relations to the Public.—In beginning, we have come to realize by experience that the more efficiently, the more thoroughly and courteously gas companies perform their duties to the public the more profitable it is for them. The open, frank, method of modern gas companies, the recognition of a mutuality of interests between the public and the company, our education of the people on the various phases of the gas business, the employment of competent tactful men, with a consequent courteous treatment towards the public, the lower rates of gas and the varied uses of it in the household—all these factors combined have aided in inspiring a closer and better relation between the consumer and the gas company. I venture to predict, as time goes on, and the public more clearly realizes this mutuality of interests and our endeavors to treat them fairly, that bitterness and criticism will largely disappear, and in their place will come a spirit of goodwill and friendly feeling towards us. In striving for this happy conclusion, it is our duty to do all we possibly can to earn and deserve the consideration of the public.

We are manufacturers and distributors of a commodity. Oil, gasolene, coal and wood compete with our fuel gas; electricity, kerosene, gasolene and other forms of illumination are our rivals in the field of lighting. We must, therefore, strive to give the best service at the lowest price.

Before we can begin business it is necessary that we secure permission from the public. This permission, usually called a franchise, imposes an obligation on us, which is a duty that must be strictly lived up to. The people are entitled by all right to good service and reasonable rates. In tearing up streets for the purpose of laying mains, we should replace the pavement in at least as good condition as it was previously; and should do it as quickly as possible. To protect the public from accidents, safeguards should be employed wherever the possibility of accident may be foreseen. It is all the more necessary for us to be careful, because of the difference between municipally operated and privately operated utilities. A municipally conducted public utility is arbitrary in its treatment of the public. Its office hours are usually between 9 A.M. and 3 P.M. It makes arbitrary rules regardless of changing conditions and compels people to observe them. It places itself, we may say, in a position so thoughtfully expressed by a certain wealthy man some years ago.

On the other hand, a privately conducted utility makes a special effort to cater to the people and changes rules whenever necessary, so as to afford the greatest freedom and opportunity to its patrons. Office hours in privately conducted utilities are usually from 8 A.M. until 6 P.M., and in many cases offices are open and should be kept open certain evenings during the week. Do we find displays of various modern appliances for lighting and heating in municipally conducted utility institutions? If a private utility failed to keep on hand a complete and attractive display of the latest and best equipments and appliances, it would be a short time only before this company would cease to do business. Municipally conducted utilities, as is well known, are not business-getters. As an inevitable consequence of this lack of aggressiveness, they fail to adopt modern improvements and thereby cause a distinct loss to the community. We must avoid their mistakes.

Electric Light Competition.—My reference to competition brings up one of the vital problems that we are called upon to meet. I refer particularly to the competition of the electric light. During the past few years the electric light has made marked progress. Its advent in the field has been of distinct benefit to gas companies, for it has stimulated us to greater efforts. We are happy to say that we have not only held our own, but also have been able to increase our business. Gas engineers, who have heretofore confined their energies to development and improved method of manufacture, are now largely devoting their attention to the sales end of the business. To-day, as never before, we lean towards economy. Every successful business institution practices it; why shouldn't we? Few consumers really know how gas should be used economically. Competent authorities estimate that fully 50 per cent. of the light produced from consumption of gas in the United States is wasted through incompetent and unintelligent illuminating engineering! Think of it! In round figures this waste amounts to more than 30 millions of dollars! We should utilize the latest appliances and methods to save this enormous drain. I understand that an interesting paper on this question will be read at this meeting. Still, I cannot resist advocating that a systematic plan of education in modern methods of illumination should be followed. We are only in the beginning of artificial light, and the higher standards of living in this country among all classes means that the opportunity to increase our business is before us—but we must not sleep!

Public Service Commissions.—An issue that we will be obliged to face, sooner or later, is that of a public service commission. Gas, as well as all other forms of public service, requires some kind of restraint for the prevention of harm to the community as well as protection to ourselves. Good men are not in control always; for, as the poet says, the good die young. Wise, old Solomon, or perhaps it was "Dooley" who said that there are exceptions to every rule—and why not in this case? Do gas men ever grow old? Some of us are so immature that our hair has hardly started to grow; but, seriously, as long as the public are interested in public service commissions, it is well that we should meet their interest half way. At its last convention the Special Committee of the American Gas Institute reported that: "Regulation is not inherently antagonistic to the best interest of the public and to the owners of gas properties and recommends that it be met in a fair and friendly spirit in an effort to direct it into just, equitable and conservative channels to the end that initiative, progress and fair dealing be stimulated and antagonism be eliminated." Local legislation, often unwise and harmful, has been the cause of much wrong to public service companies. Would we not fare better before an unprejudiced tribunal? If the personnel of a commission be high, and its power confined to strict regulation and not to management, I am inclined to favor it. As one of the leading spirits in favor of this law, however, has stated: "The hope of success depends upon the ability and character of the members forming the commission."

A State commission, of thoroughly capable and experienced men in public service, who will regulate, not manage, public utilities, may promote a better state of affairs than is possible under present local conditions. A commission is of advantage to a gas company in

various ways. It means that gas companies will no longer be at the mercy of franchise seekers and "freebooters." It means that all disputes will be taken out of the local field and referred to a competent semi-judicial body. It also means that the company will no longer be harassed by incompetent local legislators. It further implies a recognition of a perpetual franchise without competition. A particularly significant feature of the law in Wisconsin, which by-the-way, has proven quite satisfactory, is that it permits of the substitution of indeterminate franchises in place of the limited franchises heretofore prevailing. A company is, therefore, permitted in that State to operate only during good behavior. This departure is a growing realization that a short-term franchise is of no more benefit to the corporation than it is to the community itself. And why should not all franchises be perpetual? Municipalities operate under perpetual franchises and find this method to be the best. In fact, it is the only way a municipality will operate. Why not concede that an arrangement of this nature with a private company would also be most beneficial for both company and community?

I was reminded of the words of the immortal Shakespeare as I stood on the deck a few short hours ago, or was it George Ade, who said:

"Water, water, everywhere,
And all you want to drink!
When mixed up with a little Scotch
Will give us all the Blink."

This poetic effusion is offered before I touch upon the next subject—that of watered stock.

Watered Stock.—In starting a new business, it is almost invariably the rule that one man possesses the knowledge and opportunity, while another has the capital necessary to prosecute the business. Usually the "man with the idea" lacks capital. His friends, however, having confidence in him and in his ability, are willing to intrust, in a business, their capital as against his knowledge and good judgment.

The agreement, therefore, proposed by capitalists is that all property purchased by their money shall be held as security for their investment. The "man with the idea" is to have his remuneration in a portion of the profits over and above the interest on the capital invested. In every commercial undertaking this arrangement has been deemed fair and equitable. The success of the undertaking, therefore, largely depends on the ability of the organizer or man of ability. If the enterprise proves successful, he receives a remuneration equal to the extent of the success. If a failure is recorded, he gets nothing, and as well imperils the investment of his friends. This arrangement, therefore, compels the organizer to "make good," to put forth his utmost energies to achieve success. This arrangement is of two-fold benefit. It affords a certain protection to the capitalist; it calls for the utmost energies of the organizer to develop the resources and increase the business of the country. As a natural result the community at large if benefited. The manner in which a contract between the "man with the idea" and the capitalist could be expressed, would be by the issuance of bonds or preferred stock to the capitalist, and by the issuance of common stock in certain agreed portions to the man of ability and idea. This last stock is sometimes called "Watered Stock."

In this connection, I wish that the members of this Association would read the paper on this subject prepared and read by Rufus C. Dawes at a recent meeting of the Illinois Gas Association[1]—I may add that his ideas are similar to those I have entertained for some years. While abuses have crept into this custom, nevertheless no contract embodying the foregoing relationship, could be written into corporate form, except by use of this "Watered Stock."

Former President Eliot, of Harvard University, recently said on this point:

"There is much to be said on behalf of the proposition that there shall be any water in the stock of public service corporations; yet if this principle had been applied to all street railway and lighting companies during the past 35 years, the public would have waited long for facilities which they have greatly enjoyed and profited by."

To limit the capitalization of corporations to the actual cash invested would render it impossible to write in corporate form a very large and important class of partnership agreements; furthermore, it would not guarantee the actual value of the stock issued, for the par value of stock has little or no connection with its actual value. To forbid the issuance of watered stock as described, would close nearly all doors of ambition to men of ability and enterprise. It would prevent them from making arrangements to share in the profits of their own enterprise. Watered stock is simply the device offered to men of ambition and intelligence to become independent. It should not be abolished, even if it could be, for it is this incentive that influences enterprising, ambitious men to seek idle capital and to persuade it for investment. By this method the brains and energy of the country are capitalized. Destroy this arrangement and idle capital will be locked in safety vaults; stagnation would result and would continue until some other means were found to offer ambition and brains their opportunity for reward. Limiting capitalization to the actual money put into it will check development. The public have been aroused by the unwarranted abuse of stock watered in certain instances—and justly so; but I venture to assert that, when the subject is better understood, the people will allot the just rewards to men of brains and energy. In closing, I may point out that the stock of fully 75 per cent. of the corporations doing business in this country is watered, and still we hear no criticism about it.

Municipal Accounting.—A word or two about accounting in municipally operated utilities. I do not exaggerate when I assert that the system of accounting and reports prepared by the great majority of municipalities are misleading, incomplete and in many cases inaccurate. The Wisconsin Public Utilities Commission investigations prove this as well. The items of taxes, depreciation and interest on investment are usually left out of their calculations. Many other factors entering into the cost are eliminated, such as the use of water, legal department, administration expenses, etc. These inaccurate reports are often pointed out by agitators and even by newspapers as indicating how cheaply public utilities may be operated. One of the most striking evidences in this line is afforded in the case of the Duluth Board of Water and Gas Commissioners. This city owns and operates both the water and gas utilities. Gas is now sold for 75 cents net for fuel and illuminating purpoees, and 50 cents for heating and gas engines, and the claim is put forth that at these prices the city makes a very large profit. As a matter of cold fact, on analysis of the last report for 1907 and 1908 shows, instead of a surplus earning $21,254.58, which they claimed, that an actual deficit of $32,456.10 is proved.

A further examination of the report confirms this loss and shows that, including taxes and depreciation charges, gas actually costs the city of Duluth 94.52 cents—an incontestable proof that Duluth is operating its plant at an actual loss, instead of at a profit, as claimed.

I should like to hear discussions on our by-products and how we can improve upon our present methods of handling them; also, the necessity of an aggressive "New Business Department." As only one of these questions will be taken up at this time, namely, "How We Disposed of Our Surplus Coke," I would recommend that papers on these questions should be prepared for future consideration.

Obituary.—In closing, it is my sad duty to officially announce that the grim destroyer has visited our membership several times during the past year. Charles H. Jacobs, of Detroit, Fred. R. Persons, of Toledo, and Charles T. Amsden, of Dowagiac, were called to their reward. These men did their parts in the affairs of this world and left behind a record of good and noble deeds of charity and goodwill. It was my good fortune to know Fred. R. Persons intimately. He was my close personal friend for many years. On many occasions we were associated and I grew to know and love him for his many admirable qualities of mind and heart. He was always honorable and just; he endeared himself to all he met. Ever obliging and courteous, he was always faithful to his trust and true to his friends. No effort on their behalf was too much or too great a task for him. Wherever gas men met in convention, "Fred." Persons was active in promoting fellowship and good cheer. He was the life of every party. Even during his illness he never forgot to cheer up those who also suffered, and by kind word and deed did much in his quiet way to lighten the burden of his less fortunate fellowmen. He was my ideal of a man, a friend and a citizen. His life was guided by the Golden Rule. Of him it might be said:

"None knew him but to love him,
Nor named him but to praise."

In his death I, personally, and the gas fraternity in general, have suffered a loss that cannot soon be forgotten, and in future conventions:

"We shall meet but we shall miss him,
There will be one vacant chair,
We shall linger to caress him
While we breathe our evening prayer."

1. See A. G. L. J., Vol. XCI., No. 1780, p. 299.

The Modern Steam Plant.[1]

By A Cheerful Idiot.

I beg to say, as a preface to the following remarks, that this article is not intended as a joke. I am led to write it in the hope that it may do some good both to the owners of plants as well as to the stationary engineers. What I have never been able to understand is, why the average business man and property owner is so shrewd and careful in almost everything connected with his establishment except the steam end. A property owner concludes to erect a building. Nobody would ever accuse him of doing this either for fun or philanthropy. He does not accuse himself of any such nonsense. He puts up that building solely for the purpose of realizing a more or less handsome return for money invested; his lot perhaps is not very large, but he wants to get as much building on it as possible; therefore, what he lacks in ground area, he makes up in height.

Modern building laws are very strict, and everything in the building line must conform to them to the letter. Note how carefully this owner picks out his architect. Note how carefully he goes over the specifications, or at least thinks he does. Then, when he imagines himself thoroughly satisfied, he turns the whole business over to his architect, who in turn proceeds to let the various contracts, the owner, meanwhile perhaps goes to Europe, fondly thinking, that in the course of time he will return and find that he has the finest building ever. No doubt this will be true so far as appearances on the surface go, but how about mechanical details? From what I have seen the average architect knows as much about detail, that is mechanical detail, as a frog knows about pants pockets. They neither know, nor will they take advice from anyone who does. Wherein they may be likened to the tenor robusto in a grand opera company, and the things that they do to the unfortunate steam plant may be likened to the "Peace of God, which passeth understanding."

I am very much inclined to think that the architects who were responsible for the mess in which I am now wallowing, must have been descended from rabbits, for everything connected with the steam plant in this place is down in a little hole, causing me to believe more than ever in the Darwinian theory, and this is supposed to be a modern plant.

It will be conceded by all that one of the most important adjuncts to a modern building, if not the most important, is the elevator service; failure in this service causing all kinds of dissatisfaction and probable loss of patronage, therefore loss of revenue. Yet in many cases the elevator machinery is placed in the most impossible location, where it can neither be seen, got at, nor given the commonest care. As an instance, I have one electric elevator in this building and every time I look down at the motor and winding gear (I have to look down at it, for it is in a little hole), I raise my hat in admiration for the man who built it and had the courage of his convictions so splendidly developed that he consented to allow his machinery to be placed where it is. While my hat is still off, I offer up a prayer for the architect. If my prayers are answered he will certainly get his just reward. This particular hole is so small, that no one may with safety get down into it without first pulling the main switch; for, should a person be down there when the elevator moved, he would be either wound up on the drum or mixed up with the controllers In this particular connection I may say that we have holes within the hole, one hole having been made in the concrete wall so that room might be found for the commutator end of the motor, while the other hole was made also in the concrete wall for the reception of one of the brake magnets, making a very compact installation. It became necessary some time ago to turn off the commutator of the motor, of course, necessitating the temporary removal of the armature. Now, under proper conditions with reasonable room to work, this armature should have been taken out in an hour. A spare armature put into the fields and coupled up in another hour, or, lest any one should consider this rushing things, let us say 3 hours for the complete job. As a matter of fact this very simple repair job took over 13 hours to accomplish, because the motor had to be taken out bodily, unbolted from its bedplate, hoisted up, turned round and lowered down again before the armature could be reached at all. The same process, of course, had to be gone through in reverse order in the reassembling of the parts. All this was very good for the shop, but very inconvenient for the tenants of the building, who one and all prayed for me so fervently, that I kept out of sight for 3 days.

The steam plant in this building is fearfully and wonderfully made and reflects great credit on the author of its being. I am saying nothing against the actual machinery, which is all of good, modern, standard make, but the arrangement of this machinery is the most extraordinary of any I have had personal charge of, and I have come across some very funny things in my perigrinations around the country in the last 25 years. In this particular case we are burning easily 50 per cent. more fuel than we ought, owing entirely to faulty arrangements. This steam plant consists, exclusive of auxiliaries, of one boiler, three small steam pumps, a small air compressor, a hot water heating system and a heating system for the building. The auxiliaries are merely two oil pumps and a feed pump, which is connected to the return trap from the heating system, this pump not being connected to any other source of supply. Inasmuch as the heating system is not in operation during the summer months, there is no water in the receiver, consequently no feed water for the boiler, the feed pump therefor may be said to be quite useful. I would like to say also quite ornamental, but as it is down in a little hole, where it can't be seen, I cannot really say exactly what it does look like.

A man dropped in to see me the other day; he was a stranger, and being of a naturally polite disposition, I asked him what I could do for him? He replied, "Oh, nothing; I am merely looking around; I put in this pump and receiver." If I had only had an axe! As I could not get hold of one without opening a tool box, and fearing he might take fright before I could get hold of something else, I thought I would temporize with him, and begged him, therefore, to say no more on the subject, nor to tell anyone else that he had done the job, but I asked, "If you found it necessary to put this pump and receiver down in this hole, why, oh why, don't you make the hole big enough for a man to get down with it?" "Ah," said he, "the architect provided the hole; I only put the outfit where I was told." I was rather glad afterwards that the axe was locked up.

My disposition is considered sunny, and perhaps many may wonder why I entertain such naughty, wicked feelings towards him who caused this pump to be put down into this little hole. I will say, in justification, that the plungers of this confounded pump, which was expected to pump water at a temperature of at least 200°, were packed with square flax, and about a week before the advent of the man who stowed it away in its little hole we found it necessary to repack it. This operation was extremely simple and consumed over 4 hours of valuable time, because we had to disconnect the suction and discharge pipes, cut off the steam and exhaust pipes (there being no unions in sight), stand the pump up on end, pack it, put it in place again and connect it up. In the meantime, having no other means of getting the water into the boiler, we had to shut down, and as I had to do most of the work myself, I could not well get out of the way, but had to smilingly take all the compliments of the season from the tenants of the building.

Now, about 350 feet away from the boiler we have two steam pumps and an air compressor, all of which are down in a little hole, and about 75 feet further on we have a deep well pump, also down in a little hole. I don't know which of these two installations is the more unique; they are both, however, well in keeping with the rest of the plant. There is a café in the building and the deep well pump is very cleverly put down into its little hole under the café floor. It is quite true that it is under the sidewalk, but they were careful to put an I-beam in the sidewalk right over the pump, and when the plunger rod broke in two a while ago we had to rig shears in the dining room and spread the component parts of the pump out on the tables, having previously carefully removed the glassware and tablecloths and made the necessary repairs. This pump gives no trouble now, because, after having done all this work, we found that we had no water in the well; so we don't use it. But the other two pumps we have to use, because having no water in the well we are compelled to patronize Spring Valley, and while we pay full water rates we have to pump the water from cisterns through the building simply because the Spring Valley pressure is not sufficient to distribute it.

The water system is also unique, as is also the hot water heating system. I took charge of this plant late at night and the assistant engineer kindly showed me around. About 100 feet from the boiler we came to two heaters. He informed me that one was the high pressure system and the other the low. I was duly impressed, and not wishing to display too much ignorance and thereby lose caste, said "just so." We then travelled along some dark passages and finally came to this room where two pumps reposed snugly, each in their little hole and underneath two large receivers, some 54 inches in diameter by 20 feet long, placed one above the other. My assistant informed me, in an awed sort of way, that these were the receivers

1 *Journal of Electricity, Power and Gas.*

for the "Kewanee Water System." I was duly impressed again and foolishly asked why the Kewanee system was found necessary in this case. He looked at me in a pitying sort of way and said, "Why, for two reasons; the receivers are placed in the basement so that the water can't freeze, and to do away with tanks on the top of a building in a country subject to earthquakes." I have since done away with all pendulum clocks in my house and substituted those having a spring and escapement, lest I might wake up same morning and lose track of the time, owing to the former style of clock having stopped during the night.

Having been duly impressed some more with what he had told me, I asked him why there were two receivers or accumulators, as he called them. He said one was the high and the other the low pressure system. Now, when he showed me the two heaters and said one was the high and the other the low pressure system, I, as I said before, refrained from asking any questions, thinking that perhaps for some reason or other (which I should be able to discover upon further acquaintance) one was heated by live steam and the other by exhaust; but when he spoke of a high and low pressure cold water system, I thought I might venture to ask why, without lowering myself in his estimation (I am very sensitive), he pointed to the pressure gauges and said: "You see, this receiver has 60 pounds pressure on it, while this one has only 25 pounds. This high pressure receiver takes care of the house from the second floor up, while this low pressure receiver takes care of the house from the street floor down." I was again duly impressed and asked him if the heaters he had recently shown me were handled along the same lines, and he assured me that they were. I then asked him who designed this somewhat remarkable system, and he supposed it was the architect. Off came my hat, I couldn't help it. I had to pay due respect to the man who had provided two holes in the barn door. A large hole for the large cat and a small hole for the small cat. I thought it showed a liberal spirit, especially as I was afterwards informed that this cold water system cost $7,500 to install, and as we only have 126 available rooms for the accommodation of guests, I thought this seemed quite reasonable.

Now, as to these two steam pumps, as I have said before, they are down in a little hole, under these receivers. The hole is conveniently and commodiously built, so that to oil the pumps the engineer must crawl around on his hands and knees, and should it ever become necessary to take a plunger out of one of the pumps the said plunger must be sawed into at least three pieces. And as neither one of the pumps is connected up so as to be in any way interchangeable, when anything happens to either one or the other, one end of the building at least must necessarily be without either hot or cold water. We have only a very small reserve tank on the roof, fed from this system, so that if the pumps stop for a short time or a slight leak occurs, or some one, acting upon the principle of "cleanliness being next to godliness," takes a bath, the whole building is without water. The water is pumped from cisterns into these receivers and an air pressure maintained on them by an air compressor, by means of which pressure the water is distributed through the building. In other words, if we depended on our well, we should need three steam pumps and an air compressor to keep this little building of only 126 rooms supplied with water. The building is heated with live steam, the water for the building is heated with live steam, the ventilating fans are driven by electric motors, and the exhaust steam from everything goes overboard and the water of condensation is pumped into the sewer to the tune of about 1,700 gallons a day. When I asked why this water was not sent back into the boiler I was told that there was an objection to doing this on account of the cylinder oil. I ventured to say that I thought that the small amount of cylinder oil used here should not cause any trouble, but when I was informed that they had used 25 gallons in 1½ months, I thought that it might be just as well that the water of condensation went overboard instead of into the boiler.

We have only one boiler, and we are under steam 24 hours out of the 24. Therefore we cannot wash out. I am unable to say what the outcome of this is going to be. In the meantime my gray hairs, which are all I have to show as an evidence of early piety, are rapidly turning red. I have made some little changes which help. Among other things I have raised a family of 4 cats, and I am able to vent my ill-humor on them, which is fortunate, as no one at home will stand for it.

Now to recapitulate; that is a fine word whether it fits in here or not I don't quite know, but it goes. This plant was installed under the supervision of an architect, and I want to say that in no one particular have I gone outside of actual facts. I could say much more but time and space is limited and I must not trespass too much upon the good nature of the editor of this paper. One thing more, however, may be of interest, all the sewer outlets are so arranged that the water has to be swept up hill to them. I have not yet been able to get any explanation as to why this is thus. I would in all kindness ask the prospective builder of a house to think carefully in the matter of his steam plant, and consider the advisability of employing his own engineer right from the start, and pay him wages in keeping with his position, so that he will look after the owners' interests faithfully and thoroughly. Let him not wait until the plant is turned over by the contractors to the architect, and after the architect has turned it over to him, hire an engineer and then, when the engineer calls his attention to faults, abuse him and accuse him of being a very expensive man.

Have the plant installed thoroughly and in a mechanical way from the start under the supervision of a man trained for years in this particular profession, not wait until the plant is installed and then kick because the engineer wishes to make changes which are absolutely necessary for the welfare of the plant and the whole building. Neither the contractor nor the architect are practical running engineers or machinists and never go into details. They are prone to forget many items which are indispensable to the successful running of the plant. If a firm of ship owners contracts to have a ship built they appoint their own marine superintendent and their own engineering superintendent, who are on the spot from the time the blue prints come out until the ship goes into commission; why does not this rule apply to the construction of a large commercial building? The answer is lack of education on the part of owners. Good engineers, thorough mechanics, can be had at any time, and their appointment at the right moment would save the owner of a building thousands of dollars.

The Engineers' Association, which is an organization of broad-minded, thinking, trained mechanics, and which has been in existence for nearly 30 years, has very recently closed a Mechanics' Fair which was the wonder and admiration of visitors to San Francisco and residents alike. If these men were not trustworthy, if they did not command the respect of the community, could they have carried an undertaking of this kind to such a successful termination as they undoubtedly did? I think not. Therefore, it behooves owners of buildings to look into this matter carefully for their own interests and thereby save an immense sum of money.

In conclusion let me say, that if in this particular instance some one with good horse sense and mechanical ability had had the looking after of the installation of the steam machinery in this building, the owners thereof would have been saved many a heartache and many a dollar. My manager comes down to see me once in a while and he says, "Chief (he always calls me chief, because he likes to see me swell up), we are burning too much fuel." I smile and say, "Yes, sir, at least 50 per cent." He shakes his head and goes away. And I want to say, that this is the only instance in my career where I have felt really ashamed to hold out my hand at the end of the month for my pay—which I must admit, is in this case very liberal. We hope in the near future to remodel things and increase the size of the plant. In talking over the prospects with the manager I have told him to measure off my space, when the time comes for the new engine room. He and the architect can do what they like with the building, but that little space down in the little hole must be mine. He assures me that it shall be so, and as he is a liberal minded man, who fully realizes the mess we are in, he undoubtedly means what he says.

High Pressure Gas for Public Lighting.

The Committee on Street Lighting for the city of London, England, which visited the Continent to investigate the public lighting conditions abroad, made a very lengthy report, which has been abstracted and reprinted in pamphlet form by the *Gas World*.

Eight cities were visited, and that portion describing the conditions in Berlin, Germany, should be of interest.

Gas is manufactured by the municipality, but electricity is purchased in bulk from a private company.

The total number of electric arc lamps (open and flame) is 864. One-half of the lamps are extinguished at midnight—212 electric glow lamps are used, 177 being of the Nernst type.

High pressure gas lighting is very largely and effectively used; 25 miles of streets being lit by 1,531 lamps, fitted with upright and inverted burners, 2 and 3 burners in each lantern. They are supplied

direct from four separate compressing plants, at a pressure of about 53 to 78 inches. The newest type of lamps, viz., the Graetzin high pressure inverted lamp, is fitted with 3 burners per lantern, giving an illuminating value of over 4,000 candles, 2 burners being extinguished at midnight. The distance apart of these high pressure lamps is from 90 feet to 100 feet, and the average height of the lamps above the roadway, measured from the burner, about 19 feet.

Gas manufactured by the municipality is of 12-candle power, unenriched, but tested by the Metropolitan No. 2 burner, a light equal to 14 or 15-candle power is obtained. The calorific value of this gas is 540 B.T.U. This compares favorably with the proposed calorific standard for London gas, viz., 14 candles, 500 B.T.U., as inserted in the Gas Light and Coke Company's Bill.

The deputation was informed that the Berlin authorities have decided to spend $1,750,000 in installing the latest patterns of high pressure gas lamps with inverted burners, in lieu of the existing gas and electric lamps. Expenditure in this direction has been going on for 2 years, at the rate of $250,000 a year, and will be continued at the same rate for the next 5 years. The lamps used are graded according to the importance of the thoroughfares—at junctions of main streets, lamps of 4,000-candle power; in main thoroughfares lamps of 2,000-candle power; and in other streets, lamps of 1,000, 600, 400 and 200-candle power, the 400 and 200-candle power lamps being on low pressure. So far as gas is concerned, four-fifths of the city is lighted by the municipal authority, and the remaining one-fifth by the Imperial Continental Gas Association. In some streets where the municipal authority and Association meet, the latter are putting in the same kind of burner as the former.

At the present time the principal streets are lighted with high pressure incandescent gas lamps of the following types:

Lamps Consuming Cubic Feet of Gas Per Hour.							
21.2	Giving a light equal to about				636	candles	(upright burner).
28.26	"	"	"	"	1,000	"	(" & single burner).
42.4	"	"	"	"	1,364	"	(" burner).
42.4	"	"	"	"	1,540	"	(inverted, 2 burners).
53.0	"	"	"	"	1,636	"	(upright, 3 "
84.8	"	"	"	"	3,367	"	(inverted, 3 "
*84.8	"	"	"	"	4,364 to 4,550	"	" 3 "

*Newest type of the Graetzin lamp, 2 burners of which are extinguished at midnight, the upkeep not exceeding that of the 3,337-candle power lamps.

Future Lighting of Berlin.—At this point the information is given (in black type) that "in future, incandescent gas lighting only will be used in Berlin," which is followed by some particulars of the new Graetzin lamp:

The Graetzin high pressure gas lamp, named after the inventor, Herr Graetz, of Berlin, is a 3-burner inverted lamp, made to connect on to a compressing plant at about 54 to 67 inches pressures. It uses three of the large size inverted mantles, and its estimated candle power is about 4,364 to 4,555 candles, single burners giving about 1,400 to 1,500 candles, according to the Berlin photometrical tests. The gas consumption per hour of a 3-burner lamp is about 84.8 cubic feet, *i. e.*, 28.2 cubic feet per burner, therefore, the approximate lighting efficiency is about 51 to 53½ candles per cubic foot of gas consumed. The efficiency claimed is stated to be from 45 to 55 candles per foot of gas. The lamp is so made that 2 burners can be extinguished at midnight or any other arranged time, leaving one alight for the remainder of the night. Its dimensions over all are 3 feet 9 inches by 2 feet 2 inches. Its weight is 86 pounds.

It is stated the mantles at the present time are in use for about 9 days; it is, however, probable that the life of the mantle will be lengthened. One attendant serves about 50 lamps, that is, he has to clean them, replace the mantles, etc. The extinguishing and lighting are carried out automatically by change of pressure; after midnight, however, it is done by hand.

In the future scheme of lighting, the streets are to be classified and treated as follows:

First class streets will have inverted high pressure gas lamps of 4,000-candle power.

Second class streets will have inverted high pressure gas lamps of 2,000-candle power.

Third class streets will have inverted high pressure gas lamps of 1,000-candle power.

Fourth class streets will have low pressure inverted lamps of 600-candle power, each candelabra having 2 lamps with 3 burners each.

Fifth class streets receive low pressure inverted lamps of 400-candle power, each candelabra having 2 lamps with 2 burners each.

Sixth class streets receive low pressure inverted lamps of 200-candle power, each candelabra having 1 lamp of 2 burners.

The candelabra still existing with three, two and one upright mantles are being used up, and are gradually disappearing, giving place to inverted burner lamps.

Recommendations of the Deputation.—Having very carefully considered these various systems, the deputation "are of opinion that the public lighting in the city of London can be materially improved," and they have come to the following conclusions:

(1) That, wherever possible, streets should be lighted by means of centrally hung lamps, with lowering gear. This we think particularly important in the city of London, where the number of obstructions upon the footways, in the form of lamp posts, bins, letter boxes, etc., is so large.

(2) That open spaces should be lighted by means of lamps upon standards, fitted with lowering gear.

(3) That high pressure incandescent gas lamps with inverted burners should be adopted as the illuminant, but where gas is impracticable, electricity with open arc and flame arc lamps should be installed.

The deputation think, however, before suggesting any drastic alterations in the general lighting of the city, that the Streets Committee should be authorized to arrange for some further experimental lighting of the city thoroughfares, and they recommend accordingly.

Bureau of Information, The American Gas Institute.

Under the direction of the Institute it has been decreed: 1. That the privilege of submitting questions be limited to members of the Institute. 2. Neither the Board of Directors of this Institute, nor the Institute as a body, make themselves in any way responsible for the statements of fact or expressions of view given out by the Bureau of Information.

BUREAU OF INFORMATION, THE AMERICAN GAS INSTITUTE,
HEADQUARTERS, 1943 COMMERCIAL NATIONAL BANK BUILDING.
W. A. BAEHR, Chairman. CHICAGO, ILLS., Sept. 11, 1909.

Question No. 45, submitted to the Bureau was as follows:

(a) "What is the ultimate analysis of the gas oils used in the different parts of the country?"

(b) "What is the percentage of the paraffine and benzine series compounds in the gas oils used in this country?"

The Bureau has prepared no official answer to this question, deeming none necessary in view of the following exhaustive

ANSWER-AT-LARGE,

by Mr. J. L. E. Cheetham:

The gas oils as used in the different parts of the country will consist of any one of the following:

(a.) Crude oil.
(b.) Straight run oil.
(c.) Mixed or "slop" oil.
(d.) Cracked oil.

It is evident, therefore, that the original, or crude, oil will vary from the distillates, and that the distillates will vary from each other according to how the crude oil was treated at the oil refineries. For that reason, and since all investigations have been made on crude oil, the following results are based on the oil as it comes out of the ground.

The difference in the results between the crude oil and any form of its distillates will not vary to as great an extent in question "a" as in question "b." Petroleums are classed, according to their geological formation, into fields. The principal fields are as follows:

(1) Appalachian, consisting of the petroleums of Western New York, Pennsylvania, West Virginia, Southeastern Ohio and Eastern Kentucky.
(2) Ohio and Indiana.
(3) California.
(4) Texas.

(5) Kansas, Indian Territory and Oklahoma.
(6) Louisiana.

(a) "What is the ultimate analysis of the gas oils used in the different parts of the country?"

As will be seen, the ultimate analysis of the oils from different parts of the same field will vary to some extent. The endeavor has been to give as nearly as possible the best results obtainable:

(1.) APPALACHIAN FIELD.

Location.	Cumberland, W. Va.	Pennsylvania Crude.	Pennsylvania Crude.	Pennsylvania.
Spec. grav....	....	0.830	0.886	0.83
C....	86.316	85.51	84.90	86.10
H_2...	13.071	14.18	13.70	13.90
O_2.....	....	....	1.40	....
N_2...	0.230	trace.	....	....
S_2.....	....	trace.	....	0.06
Authority....	Peckman.	Mayberry.	Urquhart.	....

(2.) OHIO AND INDIANA FIELD.

Location.	Ohio.	Lima.	Ohio.	Walker, O.
Spec. grav..	....	0.831	....	0.8367
C....	84.57	80.20	86.316	85 46
H_2	13.62	17.10	13.071	13.91
O_2	....	2.70	....	....
N_2	....	....	0.230	....
S_2	0.60	....	....	0.48
Authority...	Mayberry.	W.S. Collins.	Peckman.	Palmer.

(3.) CALIFORNIA FIELD.

Location.	Santa Barbara Co.	Fresno Co.	Kern River.	Santa Clara.
Spec. grav ..	0.9845	0.8423	0.962	0 8515
C	86.32	86.24	84.43	86.08
H_2	11.70	13.08	10.99	12.88
O_2.....	....	....	3.34	....
N_2.....	1.25	....	0.65	....
S_2	0.84	6.21	0.59	0.92
Authority...	Mayberry.	Mayberry.	U. S. Gov.	O'Neil.

(4.) TEXAS FIELD.

Location.	Beaumont.	Beaumont.	Sour Lake.
Spec. grav.....	.924	.912 to .914	....
C.....	84.60	85.03	85.96
H_2.....	10.90	12.30	13.97
O_2.....	2.87	....	....
N_2.....	....	0 92	....
S_2.....	1.63	1.75	....
Authority.....	U. S. Gov.	C. Richardson.	

(b) "What is the percentage of the paraffine and benzene series compounds in the gas oils in this country?"

The paraffine or methane series of hydrocarbons (C_nH_{2n+2}) and the benzene, or aromatic, series of hydrocarbons (C_nH_{2n+6}) exist to a more or less extent in all fields of this country, with the exception of the California oils, which do not contain any hydrocarbons of the paraffine series. The actual percentage of each series in the different oils would be impossible to give, as all different compounds in the oil have not been discovered nor separated. Amount of solid paraffine has been determined in different oils, but as this would only be a part of the total paraffines in that oil, consequently the amounts of the paraffine and benzene series will be only qualitatively.

The petroleums of the Appalachian field consist principally of the paraffine series of hydrocarbons, although series less rich in hydrogen have been isolated. Mayberry has found that the hydrocarbons of the series $C\ H_{2n+2}$ are present, with but few exceptions, from butans, boiling at 10° C. (14° F.), to one of the formula $C_{32}H_{66}$, and that probably other solid paraffines are present the formula of which at present it is impossible to obtain. Richardson has obtained 11 per cent. of solid paraffine in a residue of Pennsylvania petroleum, having a gravity of .9202. Both Mayberry and Young have found considerable amounts of aromatic hydrocarbons. Young finds benzole in fraction, boiling at about 65° C. (149° F.) and 66° C. (151° F.), and toluol to a considerable extent in higher fractions. Other homologues have been detected by Mayberry. Higher hydrocarbons of this series are known to exist, but their actual structure has not been determined.

The hydrocarbons of the Ohio and Indiana field are principally of the paraffine series, though in a smaller amount than the Appalachian field; likewise, the aromatic hydrocarbons exist to a greater extent.

The paraffine series, corresponding to those in Pennsylvania oil, have been isolated from butane boiling at 0° C. (32° F.) up to and including decane $C_{10}H_{22}$, boiling at 173° C. (343° F.). Above this, the liquid members fail. Solid paraffines, however, occur in greater amount than in Pennsylvania oil, the higher series from $C_{16}H_{34}$, boiling point 211–213° C. (411° F.–415° F.), atmospheric pressure to $C_{17}H_{34}$, boiling point 177–179° C. (351–354° F.) 30 mm. pressure have been determined.

Mayberry has found the following of the aromatic series of hydrocarbons of benzol, toluol and misitylene and higher homologues, including cumol, psuedcumol, cymol, isocymol, and doubtlessly others of higher molecular weights exist.

The paraffine series, as far as is known, do not exist in California oils. Homologues of benzol form a considerable proportion of the distillates of California oil. California oil differs from the Eastern oil (Pennsylvania and Ohio) in not containing C_nH_{2n+2} (paraffine) series, and the large proportion of the C_nH_{2n-6} (benzene) series of hydrocarbons.

The paraffine series of hydrocarbons exist in Texas petroleums to a slight extent. Richardson found 1.7 per cent. solid paraffine in oily residuum (sp. gr. at 25° C.– 0.9735) from Beaumont oil. Benzene series have been isolated from Texas oil, but the predominating hydrocarbons are the C_nH_{2n-2} and C_nH_{2n-4} series.

The oils from the Kansas field differ very widely in composition from oils of any other section. The very light oils are composed to a great extent of the C_nH_{2n-2} (paraffine) series. The heavy oils, however, contain a small amount of this series. Richardson has found in the residuum of Kansas oil, produced at the Neodasha refinery, 7.8 per cent. solid paraffine. The gravity of this residuum was .9325, thus making this oil rank next to the Appalachian field and Ohio and Indiana field in quantity of the paraffine series. The Louisiana field is similar to the Texas field, and consists chiefly of the hydrocarbons of the C_nH_{2n-6} and C_nH_{2n-4} series.

Items of Interest
FROM VARIOUS LOCALITIES.

AT the invitation of the Improvement Association, of Northeast Baltimore, Md., Mr. Charles M. Cohn, Secretary of the Baltimore Consolidated Gas, Electric Light and Power Company, recently delivered a lecture on natural gas, in which he ably championed the merits of the gas as a domestic agent and forcefully explained the reason which induced or obliged the Company to take up the distribution thereof on an extended scale. In closing, Mr. Cohn remarked, "The Company desires the greatest publicity with reference to the natural gas situation, and is giving the fullest opportunity for a thorough understanding of the provisions of the ordinance and the reasons therefor."

THE new water gas set recently installed at the instance of the authorities of Albion, Neb., was satisfactorily tried out the first week of the current month. It replaces a plant of the gasoline type."

MR. A. B. EILBECK has resigned the position of General Manager of the Chattanooga (Tenn.) Gas Company, to accept a responsible position on the staff of Henry L. Doherty & Co. His headquarters will be in the Company's New York office.

MR. E. H. ROSENQUEST, as President of the Bronx (N. Y.) Gas and Electric Company, has applied to the Public Service Commission for this district for approval of a proposed bond issue in the sum of $1,500,000.

SUPERINTENDENT S. W. BROWN, of the Columbia (S. C.) Gas Light Company, reports a large increase the past summer in the placing of gas ranges. The main system has also had the benefit of his intelligent supervision, and the residents generally are disposed to acknowledge that the Company is always willing to meet them more than half-way.

WHAT do you think of this? It comes to us from Tacoma, Wash., under date of the 5th inst.: "South Tacoma wants the manufacturing plant of the Tacoma Gas Light Company moved to South Tacoma, and no effort will be spared to have the location of the present plant changed. At a meeting of the Civic Association, held August 31st, the new Manager of the Gas Company (Mr. Henry H. Hyde) was present at the meeting of the Association, when this subject was discussed, but he did not afford the hopes of the change promoters much support. The main plaint of the consumers in South Tacoma is that the pressure is so low that the use of gas is in the farcical order. When the Association first took hold of this matter it looked that they would be satisfied with a storage holder, but the

more they get or go into it the greater is their surety that a complete new plant is the panacea for their ills. Perhaps Manager Hyde can satisfy them with a high pressure line with accessories."

MR. FRANCIS ESPY has resigned the position of Superintendent of the Tiffin (O.) plant of the Consolidated Gas and Light Company to accept a like position with the Citizens Gas and Light Company at Altoona, Pa. Mr. Earl Chapman is in charge at Tiffin.

THE Gas Bench Construction Company, of St. Louis, is putting in several benches of 9's in the works of the Freeport (Ills.) Gas Light and Coke Company.

MR. R. S. BOHAN, of San Pedro, Cal., has been appointed Manager of the San Pedro (Cal.) Gas Company, vice Mr. S. M. Bellers, who is no longer financially interested in the concern.

EARLY this month Mr. and Mrs. O. N. Guldein visited Valley City, N. D., with a view to visiting his sisters, who are residents of the place named. The President of the Western Gas Construction Com- was not "long in town" ere some of the natives found out that he was largely engaged in the manufacture of gas apparatus, and the outcome of such spread of knowledge will be that on his return he will carry back with him articles of agreement under which the Western Gas Construction Company will be authorized to put in the needed apparatus for the gas supply of Valley City.

THE Public Service Commission, Second District, New York, is considering the testimony taken at the initial hearing held the second week this month, over the application of Messrs. O. F. Wright, E. P. Emerson, T. U. Beardslee, F. P. Moody and others, for the right to construct plants equal to the furnishing of gas and electric currents to the inhabitants of Port Jervis, N. Y., on light, heat and street railway purpose and account. The situation at Port Jervis is a peculiar one, and it is to be hoped that the Commission will not hold unduly tender thoughts as to "wronging" the parties who engineered the original gas, electric light and street railway consolidation at the Port.

IT is queer to have to report that the Williams dynasty is no longer in control of the *Iron Age* and its allied publications, *Metal Worker, Plumber and Steam Fitter* and *Carpentry and Building*. According to current news those have all been taken over by a group of publishers, in which group Messrs. Charles T. Root, Chas. G. Phillips, S. A. McKeel and Wm. H. Taylor figure. If these publications thrive as well under the new order as well as they did under the old, the overtakers will have plentiful reason for congratulating themselves.

THE proprietors of the Brooklyn Union Gas Company, Brooklyn, N.Y., have again disappointed the financial guessors of the Metropolis. Nine-out-of-ten of these confidently looked forward to this dividend period as the one which would register another dividend on the order pyrotechnical, but nothing of the sort was doing. Last week the Directors met and simply declared a dividend of 3 per cent., of the semi-annual type. However, the Company is actually expending large sums on account of construction.

WE are informed that the Tenney syndicate, in connection with its recent purchase of the gas and electric plants at Oswego, N. Y., has arranged for much new construction. Notable in the detail thereof is provision for placing 5,000 feet of 8-inch, 17,900 feet of 6-inch and 32,000 feet of 4-inch distributing mains. Of course, over 60 per cent. of these lengths go to replacement account, and the new proprietors are to be congratulated over their speedy determination to put the gas service right. In it, too, will come speedy reward in the shape of increased sendout regularly and properly governed.

THE Kroger Gas Coal Company has been incorporated by Messrs. Isham Kieth, H. H. Staggers, D. H. Gayle, R. J. Kroger and others, the concern being capitalized in the sum of $100,000. It is proposed to construct a modern mining plant at McWharter, and the Company owns 230 acres of 7-foot low sulphur grade coal on one division of its property, and virtually 300 acres of high grade Pittsburgh seam coal at the other extreme.

MR. ROBERT N. BRUCE has resigned from the service of the Goshen (N. Y.) Gas and Illuminating Company to take a position under the direction of Mr. George E. Woods, Engineer of Manufactures, Consolidated Gas Company's plant, Astoria, N. Y.

"B. D. C.," writing from Albany, N. Y., under date of the 3d inst., incloses the following: "As a practical demonstration of the growth of Schenectady, N. Y., in the last year, the records of the Mohawk Gas Company show a gain of over 100 meters installed in residences and other places, over any previous year. The daily output of the gas plants is not far from 650,000 cubic feet, and it is certain that that output will exceed 750,000 cubic feet before 1910 is reached.

THE outlying settlements of Robbinsdale and Columbia Heights have petitioned the Minneapolis (Minn.) Gas Company for an extension of its distributing mains to and through their streets. This is all the more noteworthy in that both places have had an electric lighting supply for years.

ACCORDING to the report of Manager W. H. Snow, of the Holyoke (Mass.) municipal lighting plants, the gain in gas sendout for last August amounted to 1.8 per cent. over the quantity reported for August, 1908. The electric output showed, for the corresponding period, the amazing gain of 66 per cent. Is Manager Snow doing anything at all in pushing gas arcs for outdoor work?

RUMOR has it, both long and loud, that in short time the plant of the Marblehead (Mass.) Gas Company will be discontinued, and the supply of gas thereto will be undertaken direct by the Lynn Gas and Electric Company.

THE Taunton (Mass.) Gas Company is arranging for carrying its gas to the residents on the east side of the river. It is also on the cards to pipe the settlement of Dighton.

WITH much regret we report the death of Mr. H. E. Clark, Jr., who passed away at his home in Laurel Springs, Pa., the morning of the 1st inst. For many years he was connected with the United Gas Improvement Company, originally having been located in Kansas City, Mo. In 1897 he was transferred to Philadelphia. We hope later to make a more extended mention of his career.

MR. AUGUST HERMANN has resigned the post of Treasurer to the Cincinnati Gas, Coke, Coal and Mining Company.

A CORRESPONDENT in Texarkana, Tex., forwards the following under date of December 3d: "The Mexican National Gas Company is making rapid progress on the plant near the Calzada de San Francisco, and the foundations are already finished. A vessel is now on its way to this country from Philadelphia, carrying all the necessary material already prepared for building two large gasholders. The larger one will have a capacity of 500,000 cubic feet and the smaller a capacity of 100,000. Other holders will be erected as needed. The Company which is back of this enterprise is a very strong one and proposes to manufacture gas from crude oil which it will produce from the native fields. E. L. Doheny is President of the Company, C. A. Canfield, Vice-President, and Norman Bridge, Secretary and Treasurer. These are the same people controlling the Mexican Fuel and Huasteca Oil Companies, exploiting the Huasteca and Ebano fields. These capitalists are from Los Angeles and have made a big success in the manufacture of gas from crude oil in the part of the country where the crude oil has an asphaltum base as in Mexico, and is fairly well adapted to the manufacture of gas. When the plant is completed the Company expects to begin with a daily production of 1,000,000 feet of gas. The Company expects to build up a large business in the supplying of gas for fuel, heating and lighting purposes, and intends to make the rate much cheaper than the electric light rate. The installation of pipe lines, fixtures and plant will involve the expenditure of large sums, but the Company has already let contracts for over $1,000,000. It is thought that the plant will be completed by December, so that the Company will begin delivering this year. This will depend upon the fulfilment of the contracts for laying pipe and installing apparatus. A shipment of 2,000 tons of iron pipe was received a few days ago and most of it is now in the city. As the Company intends to lay great stress on the supplying of gas for domestic consumption in heating, lighting and fuel, it will establish a store for the sale of the necessary fixtures in October, and will also begin its advertising and soliciting campaign for the obtaining of new business."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHARLES H. WADELTON,
MANAGER.

MONDAY, SEPTEMBER 20, 1909.

The Market for Gas Securities.

The market for gas securities has been upward in sympathy with the general movement, both Consolidated and Brooklyn Union being two points higher than a week ago.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 20.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated Gas Co.	$78,177,000	100	147	147⅓
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1947, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	149½	152
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91¾	92
Yonkers	200,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	1½	1¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	78½
Capital, Sacramento	500,000	50	—	85
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,600,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	78½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	881,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	0
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,630,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	104	105
Preferred	2,500,000	100	—	98
Bonds	10,000,000	1,000	104	—
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108½
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	65¾	65¾
Preferred	25,000,000	100	—	—
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	116¼	116¾
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—

Advertisers' Index.

New advertising, or changes in standing ads., to assure attention the issue following their reception, must be in hand on Wednesday.

GAS ENGINEERS. Page

Bartlett-Hayward Co., Baltimore, Md. 753
Cruse-Kemper Co., Philadelphia, Pa. 740
Davis & Farnum Mfg. Co., Waltham, Mass. 752
Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Frank D. Moses, Trenton, N. J. 734
Frederick J. Mayer, New York City. 733
Henry I. Lea, Chicago, Ills. 752
H. M. Byllesby & Co., Chicago, Ills. 752
Humphreys & Glasgow, New York City. 752
Improved Equipment Company, New York City. 734
Isbell-Porter Co., Newark, N. J. 740
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 737
Quintard Iron Works, New York City. 741
R. D. Wood & Co., Philadelphia, Pa. 754
The Gas Machinery Co., Cleveland, O. 732
The Stacey Mfg. Co., Cincinnati, O. 755
The United Gas Improvement Co., Philadelphia, Pa. 747
Western Gas Construction Co., Fort Wayne, Ind. 712
William A. Baehr, Chicago, Ills. 730

GAS WORKS APPARATUS AND CONSTRUCTION.

Bartlett-Hayward Co., Baltimore, Md. 753
Chamber Oven Co., Milwaukee, Wis. 735
Connelly Iron Sponge & Governor Co., New York City. 749
Continental Iron Works, Brooklyn, N. Y. 750
Cruse-Kemper Co., Philadelphia, Pa. 740
Davis & Farnum Mfg. Co., Waltham, Mass. 752
Deily & Fowler Mfg. Co., Philadelphia, Pa. 756
Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Gas Engineering Co., Trenton, N. J. 734
Humphreys & Glasgow, New York City. 752
Improved Equipment Company, New York City. 734
Isbell-Porter Co., New York City. 740
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Lloyd Construction Co., Detroit, Mich. 730
Quintard Iron Works Co., New York City. 741
R. D. Wood & Co., Philadelphia, Pa. 754
Riter-Conley Mfg. Co., Pittsburgh, Pa. 739
The Gas Machinery Co., Cleveland, O. 732
The Stacey Mfg. Co., Cincinnati, O. 755
The United Gas Improvement Co., Philadelphia, Pa. 747
Western Gas Construction Co., Fort Wayne, Ind. 712

PROCESSES.

Bartlett-Hayward Co., Baltimore, Md. 753
Chamber Oven Co., Milwaukee, Wis. 735
Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
Humphreys & Glasgow, New York City. 752
Improved Equipment Company, New York City. 734
The Gas Machinery Co., Cleveland, O. 732
The United Gas Improvement Co., Philadelphia, Pa. 747
Western Gas Construction Co., Fort Wayne, Ind. 712

SCRUBBERS AND CONDENSERS.

Bartlett-Hayward Co., Baltimore, Md. 753
Continental Iron Works, Brooklyn, N. Y. 750
Cruse-Kemper Co., Philadelphia, Pa. 740
Davis & Farnum Mfg. Co., Waltham, Mass. 752
Economical Gas Apparatus Construc. Co. Toronto, Ont. 730
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Isbell-Porter Co., Newark, N. J. 740
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
Quintard Iron Works, New York City. 741
R. D. Wood & Co., Philadelphia, Pa. 754
Riter-Conley Mfg. Co., Pittsburgh, Pa. 739
The Gas Machinery Co., Cleveland, O. 732
The Stacey Mfg. Co., Cincinnati, O. 755
The United Gas Improvement Co., Philadelphia, Pa. 747
Western Gas Construction Co., Fort Wayne, Ind. 712

PRODUCER POWER PLANTS.

Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
R. D. Wood & Co., Philadelphia, Pa. 754

TAR AND CARBONIC ACID EXTRACTOR.

Bartlett-Hayward Co., Baltimore, Md. 753
Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
Isbell-Porter Co., Newark, N. J. 740
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
The Gas Machinery Co., Cleveland, O. 732
The Stacey Mfg. Co., Cincinnati, O. 755
The United Gas Improvement Co., Philadelphia, Pa. 747
Western Gas Construction Co., Fort Wayne, Ind. 712

AMMONIA CONCENTRATORS.

Bartlett-Hayward Co., Baltimore, Md. 753
Michigan Ammonia Works, Detroit, Mich. 730
The Gas Machinery Co., Cleveland, O. 732
Western Gas Construction Co., Fort Wayne, Ind. 712

GAS METERS.

American Meter Co., New York and Philadelphia. 759
D. McDonald & Co., Albany, N. Y. 757
Helme & McIlhenny, Philadelphia, Pa. 759
John J. Griffin & Co., Philadelphia, Pa. 760
Keystone Meter Co., Royersford, Pa. 758
Maryland Meter and Mfg. Co., Baltimore, Md. 758
Metric Metal Co., Erie, Pa. 759
Nathaniel Tufts Meter Co., Boston, Mass. 758
New York Improved Meter Co., New York City. 758
Pittsburg Meter Co., East Pittsburg, Pa. 738
Rotary Meter Co., New York City. 731
Sprague Meter Co., Bridgeport, Conn. 757

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia. 759
D. McDonald & Co., Albany, N. Y. 757
Helme & McIlhenny, Philadelphia, Pa. 759
John J. Griffin & Co., Philadelphia, Pa. 760
Keystone Meter Co., Royersford, Pa. 758
Nathaniel Tufts Meter Co., Boston, Mass. 758
New York Improved Meter Co., New York City. 758
Pittsburg Meter Co., East Pittsburg, Pa. 738
Sprague Meter Co., Bridgeport, Conn. 757

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City. 758

WATER METERS.

Pittsburg Meter Co., East Pittsburg, Pa. 738

GAS AND WATER PIPES.

Davis & Farnum Mfg. Co., Waltham, Mass. 752
Donaldson Iron Co., Emaus, Pa. 744
Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
R. D. Wood & Co., Philadelphia, Pa. 754

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila. 740
Perkins Co., New York City. 740
Westmoreland Gas Coal Co., Philadelphia, Pa. 751

GAS MAIN STOPPERS.

Safety Gas Main Stopper Co., New York City. 734

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y. 751

GAS TAPPING MACHINES.

George Light, Dayton, O. 751
H. Mueller Manufacturing Co., Decatur, Ills. 734

CANNEL COALS.

Perkins & Co., New York City. 750

STOKING MACHINERY.

G. A. Bronder, New York City. 749
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 737

CONVEYORS—ALL KINDS.

Bartlett-Hayward Co., Baltimore, Md. 753
Cruse-Kemper Co., Philadelphia, Pa. 740
C. W. Hunt Company, New York City. 752
Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
G. A. Bronder, New York City. 739
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
The Gas Machinery Co., Cleveland, O. 732
The Stacey Mfg Co., Cincinnati, O. 755
Western Gas Construction Co., Fort Wayne, Ind. 712

CHARGING BARROWS & COAL WAGONS.

Davis & Farnum Mfg. Co., Waltham, Mass. 752
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
The Stacey Mfg. Co., Cincinnati, O. 755

GAS ENRICHERS.

Standard Oil Co., New York City. 709

COKE CRUSHERS.

Bartlett-Hayward Co., Baltimore, Md. 753
C. M. Keller, Columbus, Ind. 751

GAS METER CONNECTIONS.

H. Mueller Manufacturing Co., Decatur, Ills. 735

GAS COCKS.

H. Mueller Manufacturing Co., Decatur, Ills. 735

GAS GAUGES.

The Bristol Co., Waterbury, Conn. 744

GAS GOVERNORS.

Chaplin-Fulton Mfg. Co., Pittsburg, Pa. 750
Connelly Iron Sponge & Governor Co., New York City. 749
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Isbell-Porter Co., Newark, N. J. 740
Pittsburg Meter Co., East Pittsburg, Pa. 738
Reynolds Gas Regulator Co., Anderson, Ind. 749

CEMENTS.

C. L. Gerould, New Castle, Pa. 748
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Strassburger Bros., Chicago, Ills. 748

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md. 748
Chamber Oven Co., Milwaukee, Wis. 735
Didier-March Co., New York City. 733
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Gas Bench Construction Co., St. Louis, Mo. 741
Henry Maurer & Son, New York City. 741
Improved Equipment Company, New York City. 734
James Gardner, Jr., Co., Bolivar, Pa. 750
J. H. Gautier & Co., Jersey City, N. J. 748
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Missouri Firebrick Co., St. Louis, Mo. 748
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 737

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md. 748
Didier-March Co., New York City. 733
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Gas Bench Construction Co., St. Louis, Mo. 741
Improved Equipment Company, New York City. 734
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 737

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 749
Didier-March Co., New York City. 733
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Gas Bench Construction Co., St. Louis, Mo. 741
Improved Equipment Company, New York City. 734
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 737

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md. 748
Bartlett, Hayward & Co., Baltimore, Md. 753
Didier-March Co., New York City. 733
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Gas Bench Construction Co., St. Louis, Mo. 741
Improved Equipment Company, New York City. 734
J. H. Gautier & Co., Jersey City, N. J. 748
Laclede-Christy Clay Products Co., St. Louis, Mo. 748
Missouri Firebrick Co., St. Louis, Mo. 738
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 737

SELF-SEALING MOUTHPIECE DOORS.

Bartlett-Hayward Co., Baltimore, Md. 753
Continental Iron Works, Brooklyn, N. Y. 754
Davis & Farnum Mfg. Co., Waltham, Mass. 752
Isbell-Porter Co., Newark, N. J. 740
Improved Equipment Company, New York City. 734
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 737
Quintard Iron Works, New York City. 741
R. D. Wood & Co., Philadelphia, Pa. 754
The Gas Machinery Co., Cleveland, O. 732
The Stacey Mfg. Co., Cincinnati, O. 755
Western Gas Construction Co., Fort Wayne, Ind. 712

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich. 737
Welsbach Company, Gloucester, N. J. 746

BURNERS.

Wm. M. Crane Co., New York City. 744

STREET LAMPS.

Thos. T. W. Miner, New York City. 730
Welsbach Street Lighting Co., New York and Phila. 746

GAS BLAST FURNACES.

American Gas Furnace Co., New York City. 743

PURIFIERS.

Bartlett-Hayward & Co., Baltimore, Md. 753
Connelly Iron Sponge & Governor Co., New York City. 749
Cruse-Kemper Co., Philadelphia, Pa. 740
Davis & Farnum Mfg. Co., Waltham, Mass. 752
Evens & Howard Firebrick Co., St. Louis, Mo. 742
Isbell-Porter Co., Newark, N. J. 740
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
Quintard Iron Works, New York City. 741
R. D. Wood & Co., Philadelphia, Pa. 754
The Stacey Mfg. Co., Cincinnati, O. 755
The United Gas Improvement Co., Philadelphia, Pa. 747
Western Gas Construction Co., Fort Wayne, Ind. 712

VALVES.

Bartlett-Hayward & Co., Baltimore, Md. 753
Continental Iron Works, Brookin, N. Y. 750
Davis & Farnum Mfg. Co., Waltham, Mass. 752
Economical Gas Apparatus Construc. Co., Toronto, Ont. 730
Isbell-Porter Co., Newark, N. J. 740
Kerr Murray Mfg. Co., Fort Wayne, Ind. 753
Ludlow Valve Manufacturing Co., Troy, N. Y. 741
R. D. Wood & Co., Philadelphia, Pa. 754
The Gas Machinery Co., Cleveland, O. 732
The P. H. & F. M. Roots Co., Connersville, Ind. 743
The Stacey Mfg. Co., Cincinnati, O. 755
Western Gas Construction Co., Fort Wayne, Ind. 712

(*Continued on page* 730.)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Sept. 8, 1909.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 15th, 1909, to stockholders of record at the close of business, Sept. 30, 1909. Checks will be mailed.

1788-5 LEWIS LILLIE, Treasurer.

WANTED,

A Position as Manager or Superintendent

Of a coal or water gas plant, or combined plant. Am getting the best of results at present place of employment. Have excellent recommendations. Address, "F. J. R.,"

1787-4 Care this Journal.

Position Wanted

By ambitious young man in plant manufacturing coal and water gas. Wants to learn business. At present employed as distribution superintendent of high and low pressure systems. Has 8 years' general experience in gas business in large town.

Address, "I. S.,"

1789-2 Care this Journal.

WANTED,

A Position as Foreman of Shop or Street, or to Take Entire Charge of the Distribution.

I am a young married man, strictly sober and industrious, and a first-class workman. Experienced on both high and low paessure water and coal gas. First-class references and r. commends. Will go anywhere. Address, "1777,"

1789-2 Care this Journal.

WANTED,

Position as Superintendent of Water or Coal Gas Plant, or Both.

Medium size town preferred.

Address, "GAS SUPERINTENDENT,"

1788-2 Care this Journal.

Position Wanted.

Solicitor, with Good Record as Business Getter,

Desires permanent position. Employed in present position for 4 years, but desires a change. Best of references. Address, "S. S.,"

1789-1 Care this Journal.

WANTED,

By a corporation, within the next 30 days, a competent and practical engineer, one who has knowledge of drafting and engineering, to take charge of several combination gas and electric light and water works. Permanent position. State salary wanted and give full references, which will be treated confidentially. Address, "H. C. S., JR.,"

1788-2 Care this Journal.

FOR SALE,

ONE SET OF "KING'S TREATISE ON COAL GAS,"

Three volumes. Edition 1882. Price, $100.

Address,
AMERICAN GAS LIGHT JOURNAL,
42 PINE STREET, NEW YORK CITY.

FOR SALE,

One set of 4 purifying boxes 12 feet 8 inches by 10 feet 9 inches by 3 feet, in good condition, with centerseal and 10-inch connections. Also one American 8-foot station meter.

1771-tf YORK GAS CO., York Pa.

FOR SALE,

Two (2) No. 3 Rotary Station Meters.

Capacity, 500 to 5,000 cubic feet per hour. Meters have never been in use, owing to change in works. Will dispose of at a bargain.

KELSEY, BREWER & CO.,

1788-3 Grand Rapids, Mich.

FOR SALE.

GAS HOUSE EQUIPMENT AND METERS.

Bench Room consists of two pit and one surface bench of 6's, one cold air condenser; one 40-horse power marine boiler.

Scrubber and Condensing Room, two scrubbers, size 20 by 3½.

One Water Condenser, size 20 by 3½.

One Ammonia Extractor, one Tar Extractor, one Exhauster, capacity 250,000 feet.

One-Horse Power Vertical Steam Engine.

One Center Seal, two Purifying Boxes, size 14 by 14 feet, one Station Meter, D. McDonald & Co., Albany, N. Y.

One Station Governor.

List of Gas Meters.

Keystone	*Harris & Griffin.*	*Standard.*	*American,*
6 5-light.	10 5-light.	2 5-light.	37 3-light.
7 3-light.	1 10-light.	7 3-light.	41 5-light.
1 10-light.	20 3-light.	—	2 20-light.

McDonald.	*John Griffin.*	*Harris Bros.*
21 3-light.	35 3-light.	42 3-light.
1 10-light.	3 5-light.	7 5-light.
3 5-light.	2 45-light.	—
2 200-light.	2 10-light.	—

One Telescope Gasholder, 2-lift, capacity 125,000 cubic feet.

Having discontinued the gas business on account of natural gas being piped into this city, the above named property is offered for sale by the

CITIZENS LIGHT AND POWER CO.,

1789-2 Xenia, Ohio.

FOR SALE.

One Primary Air Condenser, 20 feet high, 4 feet 6 inches diameter, 12-inch connections.
One Secondary Air or Water Condenser, 20 feet high, 4 feet diameter, 10-inch connections.
One Secondary Water Condenser, 15 feet high, 3 feet, 6 inches diameter, 10-inch connections.
Two Scrubbers, each 4 feet diameter, 10-inch connections.
One Scrubber, 3 feet diameter, 12-inch connections.
One 8-inch Roots Exhauster, with 3 by 4½ Upright Engine, direct connected.
Four 10 by 10 by 3-Foot Lime Purifying Boxes, with 12-inch connections.
One Smith-Valle No. 2 Pump.
One Davidson 4½ by 2½ by 6-Inch Pump.
One American Meter Company Station Meter, 5 feet 6 inches by 5 feet 6 inches.
One American Meter Company Station Meter, 3 feet 6 inches by 3 feet 3 inches.
One Cast Iron Hydraulic Main, 10 feet long.
One Wrought Iron Hydraulic Main, 12 feet long.
One Wrought Iron Hydraulic Main, 21 feet 6 inches long.
Ironwork for 4 benches of 6's.
One 12-Inch Connolly Street Main Pressure Governor, with by-pass valves.
One No. 10 P. & A. Tar Extractor.
One 3-Foot U. G. I. Water Gas Set, complete.
3,500 Bushels of Oxide.

All of the above in close proximity to Kansas City and in first-class condition. Address, "NATURAL GAS,"

1787-4 Care this Journal.

(Concluded from page 729.)

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City 749
F. Behrend, New York City 730
The United Gas Improvement Co., Philadelphia, Pa... 747

EXHAUSTERS.

Connelly Iron Sponge & Governor Co.,New York City 749
Connersville Blower Company, Connersville, Ind..... 756
Davis & Farnum Mfg. Co., Waltham, Mass..... 752
Isbell-Porter Company, Newark, N. J..... 740
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 753
Piqua Blower Co., Piqua, O..... 741
The P. H. & F. M. Roots Co., Connersville, Ind..... 743

HIGH PRESSURE GAS GOODS.

H. Mueller Manufacturing Co., Decatur, Ills..... 735

PURIFIER AND SCRUBBER TRAYS.

Bartlett-Hayward Co., Baltimore, Md..... 753
Cabot Mfg. Co., Hoboken, N. J..... 751
Western Gas Construction Co., Fort Wayne, Ind..... 712

PIPE LINE TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills..... 735

GAS PLANT TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills..... 735

GAS STOVES.

American Meter Co., New York and Philadelphia..... 745
Keystone Meter Co., Royersford, Pa..... 758
Maryland Meter & Manufacturing Co., Baltimore, Md... 758
Nathaniel Tufts Meter Co., Boston, Mass..... 758

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich..... 730

GASHOLDERS.

Bartlett-Hayward Co., Baltimore, Md..... 753
Continental Iron Works, Brooklyn, N. Y..... 750
Cruse-Kemper Co., Philadelphia, Pa..... 740
Davis & Farnum Mfg. Co., Waltham, Mass..... 752
Deily & Fowler Mfg. Co., Philadelphia, Pa..... 756
Economical Gas Apparatus Construc. Co., Toronto, Ont.. 730
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 753
R. D. Wood & Co., Philadelphia, Pa..... 754
Riter-Conley Mfg. Co., Pittsburgh, Pa..... 739
The Stacey Mfg. Co., Cincinnati, O..... 755
Western Gas Construction Co., Fort Wayne, Ind..... 712

STORAGE TANKS.

Bartlett-Hayward Co., Baltimore, Md..... 753
Davis & Farnum Mfg. Co., Waltham, Mass..... 752
Quintard Iron Works, New York City..... 741
The Stacey Mfg. Co., Cincinnati, O..... 755
Western Gas Construction Co., Fort Wayne, Ind..... 712

LEATHER BELTING.

Chas. A. Schieren Co., New York City..... 736

PATENTS, TRADE-MARKS AND COPYRIGHTS.

Royal E. Burnham, Washington, D. C..... 751

Utilize Your Gas Liquor.
NO EXTRA LABOR OR OPERATING EXPENSES.
IMPROVED AMMONIA CONCENTRATOR.
About 100 in use. Write to
STROH & OSIUS, Patentees, or
MICHIGAN AMMONIA WORKS, - Detroit, Mich.

WILLIAM A. BAEHR,
CONSULTING ENGINEER,
Commercial National Bank Building,
CHICAGO.
Also Representing
The Bartlett-Hayward Company.

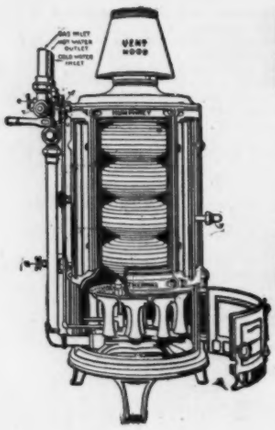
Celebrated Lux Gas Purifying Mass
Will Save 50 Per Cent. Labor.
Used in the Gas Works of Berlin, Kiel, Frankfort, Vienna, Amsterdam, Antwerp, London, Edinburgh, Copenhagen, Madrid, Seville, Barcelona, Rio de Janeiro and others. :: :: ::
Sole Importer, F. BEHREND,
54 Front St., New York.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,
Consulting Engineers.
Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::
PLANS, SPECIFICATIONS AND ESTIMATES PREPARED.
AMERICAN OFFICE:
269 Front St., East, Toronto, Canada.

LLOYD CONSTRUCTION COMPANY
GAS APPARATUS.
DETROIT—MICHIGAN

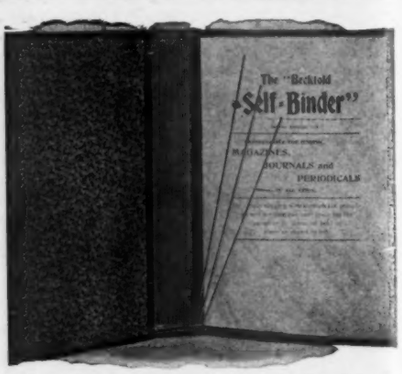
"THE MINER"
GLOBE STREET LAMPS.
OVER FORTY YEARS IN USE THE WORLD OVER.
THE BEST STREET LAMPS for ALL KINDS OF GAS OR BURNERS.
This is only one of a Large Variety of Styles.
SEND FOR CATALOGUE.
THOS. T. W. MINER,
821 and 823 Eagle Avenue, New York.

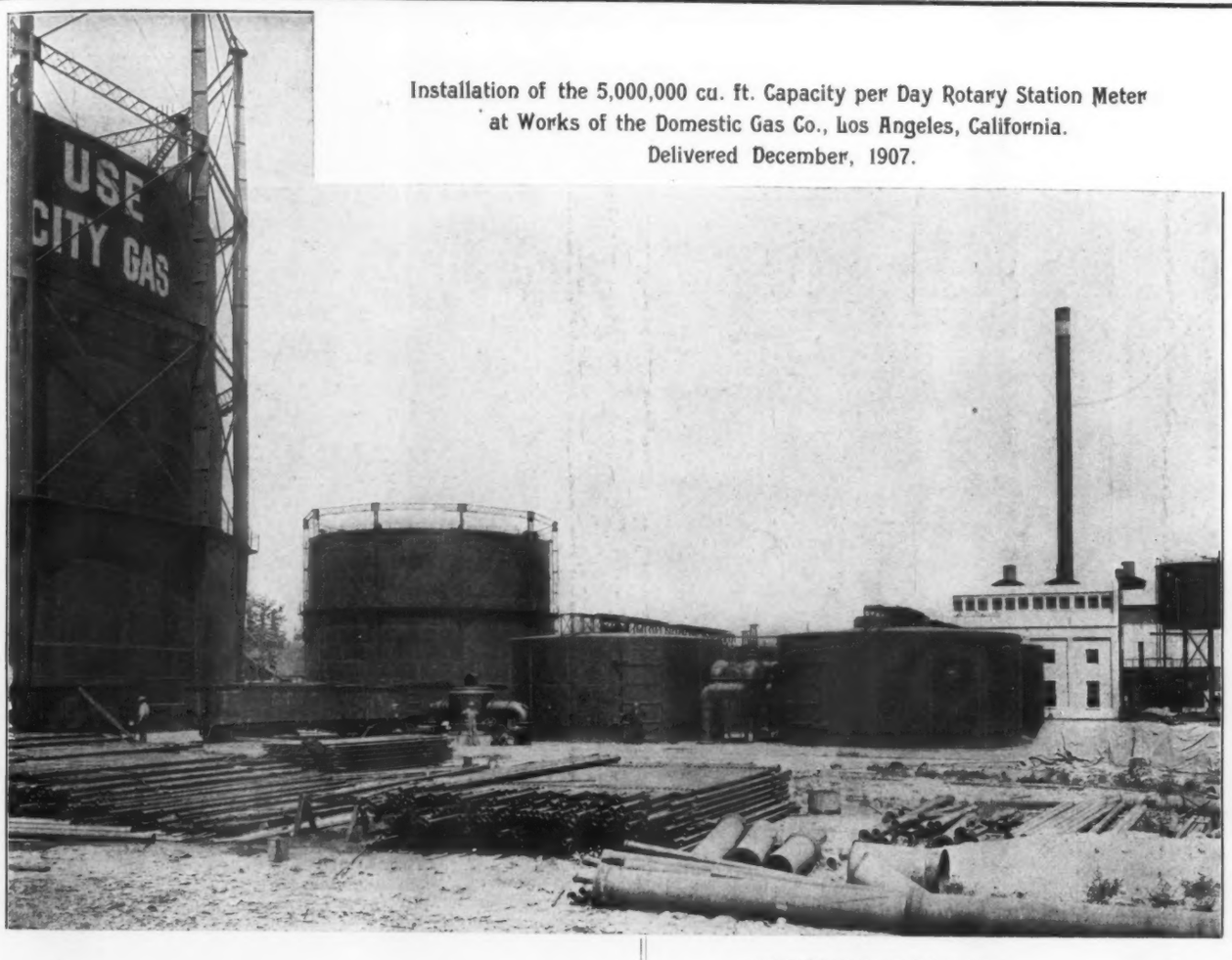
NO. 100 LAMP.



Humphrey Auto-Thermal Instantaneous Water Heaters
Have every known desirable feature helping to efficiency, economy, durability and absolute safety.
FULLY GUARANTEED.
PRICES LOW.
QUALITY AND SERVICE HIGH.
Will you help us sell them?
HUMPHREY CO.,
Kalamazoo, Mich., U. S. A.

BINDERS FOR THE **JOURNAL.**
PRICE, **$1.**
FOR SALE BY
AMERICAN GAS LIGHT JOURNAL 42 Pine St., New York City.





Installation of the 5,000,000 cu. ft. Capacity per Day Rotary Station Meter at Works of the Domestic Gas Co., Los Angeles, California. Delivered December, 1907.

DOMESTIC GAS COMPANY
624 PACIFIC ELECTRIC BUILDING
LOS ANGELES, CAL.

August 12th, 1909.

ROTARY METER CO.,
280 Broadway,
New York City.

Gentlemen:

Thinking that some actual figures would be of interest with reference to the accuracy of our 5,000,000 cubic foot capacity Rotary Meter, which we have had in use now about eighteen months, I am pleased to attach a report of our tests.

You will observe that our observations are taken at or about midnight. This is done in order to obviate the necessity of correcting the volume as at the time referred to we were able to get temperature conditions the same.

We are very much pleased with the operation of the meter and have them in use in all of our plants.

Yours very truly,

JMB/LC
(Encl)

ENGINEER.

Result of Tests made on Rotary Meter BY Domestic Gas Company.

Test made.....	April 5, 1909.	July 26, 1909.	August 10, 1909.
Holder beginning of test	27' 2" 135,600 cu. ft.	25' 5" 127,800 cu. ft.	24' 4" 122,300 cu. ft.
Holder end of test	2' 5" 12,100 "	2' 9" 13,800 "	2' 8" 13,400 "
Gas removed	124,500 "	114,000 "	108,900 "
Meter statement end of test	263,343,800 "	269,640,400 "	278,263,300 "
Meter statm't beginning of test	263,219,600 "	269,527,600 "	278,154,700 "
Amount of gas registered	124,200 "	112,800 "	108,600 "
Difference	300 "	1,200 "	300 "
Meter slow	2-10 of 1%	1%	3-10 of 1%
Rate of flow per hour	65,000 "	76,000 "	69,000 "
Temperature conditions	Uniform (Midnight)	Uniform (Midnight)	Uniform (10 P.M.)

(Relief holder calibrated, therefore no error in the amount of gas removed.)

P. PLANTINGA, President W. E. STEINWEDELL, Secretary

THE GAS MACHINERY CO.,

Main Office and Shops

CLEVELAND, OHIO.

NEW YORK OFFICE, - - - 56 PINE STREET.

COAL AND WATER GAS APPARATUS,
EXHAUSTERS, CONDENSERS, SCRUBBERS,
TAR EXTRACTORS, WASHERS, PURIFIERS,
VALVES, CONNECTIONS,
BY PRODUCT MACHINERY,
COMPLETE GAS PLANTS.

ROUND STEEL PURIFIERS WITH GATE AND DOUBLE SEATED REVERSING VALVE CONNECTIONS.

THE GAS MACHINERY CO.
CLEVELAND, OHIO.

DIDIER-MARCH COMPANY,

Hudson Terminal Building,

WORKS:
Keasbey, Perth Amboy, N. J.

50 Church Street,
NEW YORK, N. Y.

DESSAU SYSTEM OF VERTICAL RETORTS,

"The Only System in Successful Operation."

U. S. Patent No. 904043.
"Process Patent for the Carbonization of Coal in Vertical Retorts."

U. S. Patent No. 801268.
"Operating Mechanism for Bottom Mouthpieces."

U. S. Patent No. 906187.
"Feeding Device."

U. S. Patent No. 899503.
"Retort House."

U. S. Patent No. 915156.
"Recuperation."

388 Benches, with 3984 Retorts in operation and under construction.

TOTAL DAILY PRODUCING CAPACITY, 60,000,000 CUBIC FEET.

First Installation in the United States of America,

PROVIDENCE, R. I., 12 BENCHES, 120 RETORTS,

Complete, with

Retort House, Coal and Coke Handling Machinery and Storage Bins.

HORIZONTALS AND INCLINES OF APPROVED TYPES.

Correspondence Solicited. **FREDERICK J. MAYER, General Manager.**

WE STOP CLINKERS.

AFTER CONVINCING THEMSELVES BY A THOROUGH TRIAL THAT THE DOHERTY BENCH FUEL ECONOMIZER MORE THAN MET ALL OUR GUARANTEES, ANOTHER COMPANY HAS JUST PLACED AN ORDER WITH US TO EQUIP ALL THEIR BENCHES WITH THE ECONOMIZER.

HOW MANY? 32 BENCHES.

YOU CAN GET THE SAME RESULTS WITH THE ECONOMIZER.

HORIZONTALS—INCLINES—VERTICALS.

Sole Agents for the Western States for the Dessau System of Vertical Retorts.

THE IMPROVED EQUIPMENT COMPANY,

MAIN OFFICES: 60 WALL STREET, NEW YORK, N. Y.

SOLE LICENSEES FOR THE DOHERTY BENCH FUEL ECONOMIZER.

LONG DISTANCE TELEPHONE, 1503-D.

FRANK D. MOSES, President.

GAS ENGINEERING CO.,

MANUFACTURERS AND ERECTORS OF

COMPLETE GAS WORKS.

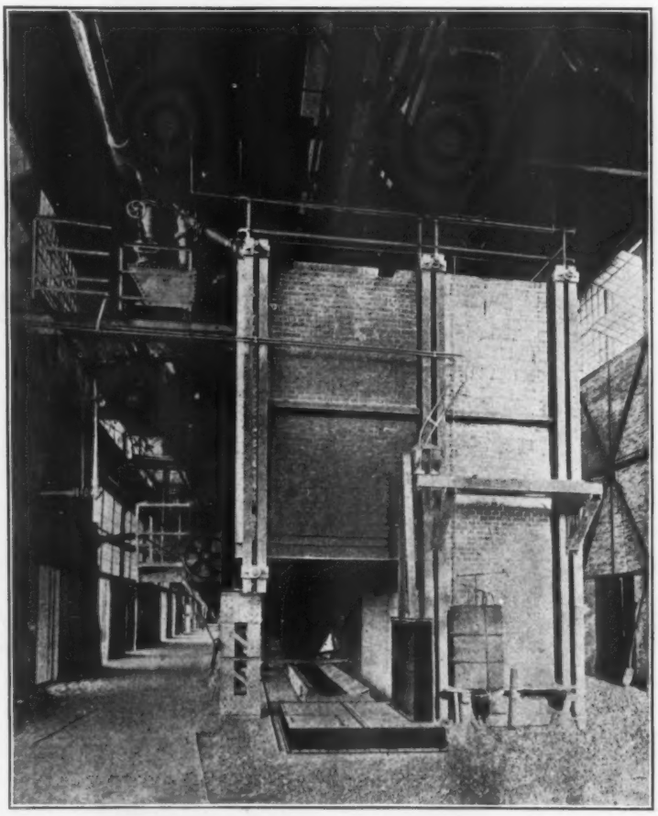
SPECIAL ATTENTION GIVEN TO LARGE PURIFIERS.

OFFICE AND WORKS, - - - - - - TRENTON, N. J.

CHAMBER OVENS.

Do You Know About Chamber Ovens?

Horizontal, Vertical, or Inclined.



If your output is over 250,000 feet per diem don't fail to consult

THE CHAMBER OVEN CO.,

405 Keene St.,

MILWAUKEE, WIS.

FRED. BREDEL, President.

WM. H. CAMPBELL, Eastern Agent,

Virginia State Insurance Building, Richmond, Va.

Vertical Chamber Oven with five chambers. Capacity, 150,000 cubic feet per oven.

A Convenience And a Protection.

The Mueller Leather carrying bag for calking tools is a convenience to the workman and a protection to his tools.

There is a place for each of the ten tools constituting the set which is designed for use on mains 12-inch and smaller, and room for overalls beside.

This calking set is made of the finest octagonal tool steel, finely finished and tempered by special process. The calking irons range from ⅛ to 5/16 inch thickness at the point.

Unconditionally Guaranteed.

TRADE MARK
MUELLER
REGISTERED

Works and General Offices,
DECATUR, ILL., U. S. A
West Cerro Gordo St.

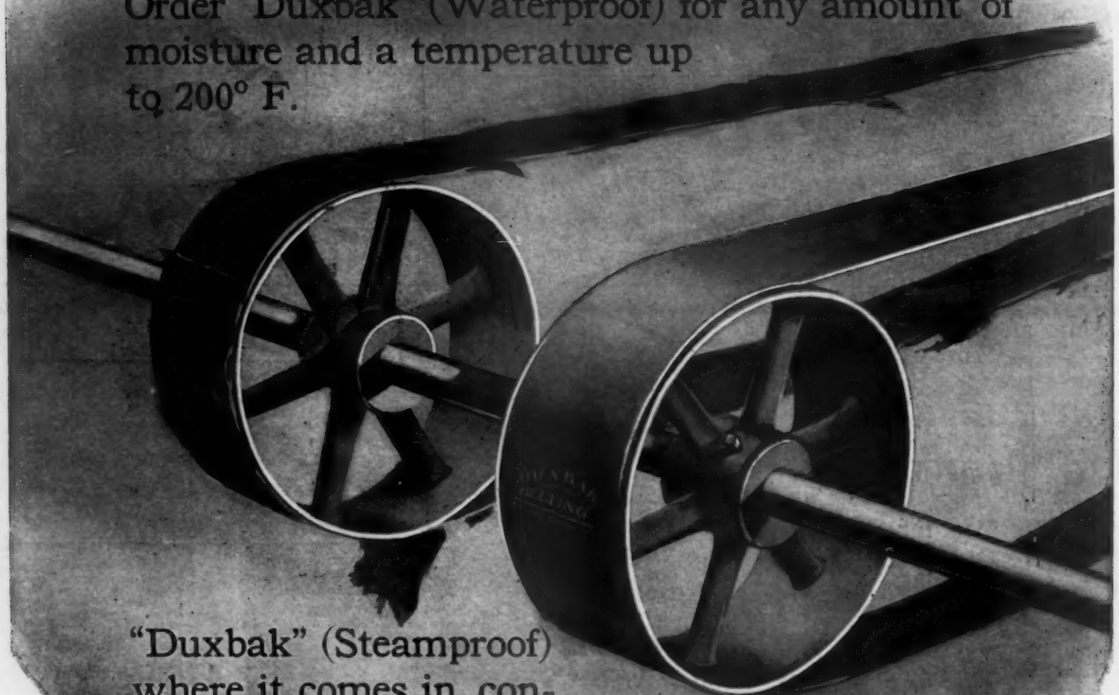
H. MUELLER MFG. CO.

Eastern Division,
NEW YORK, N. Y., U. S. A.
254 Canal St. (cor. Lafayette).

THERE may come a time when your belting is subjected to moisture that loosens the joints and destroys ordinary belting.

If you use Schieren's Duxbak Leather Belting, that moisture would only tend to give the belt more suction on the pulleys and would not hurt the belt in the least.

Order "Duxbak" (Waterproof) for any amount of moisture and a temperature up to 200° F.



"Duxbak" (Steamproof) where it comes in contact with boiling hot water or live steam. Send for the Belt Book (issued monthly).

Chas. A. Schieren Company
ESTABLISHED 1868

TANNERS
BELT MANUFACTURERS

NEW YORK, 30-38 Ferry St. (Gas Dept.)
CHICAGO, 84-86-88 Franklin St.
BOSTON, 641 & 643 Atlantic Ave. (Opposite South Station).
PHILADELPHIA, 226 North 3d St.
PITTSBURG, 205 Wood St.
DENVER, 1752 Arapahoe St.
BROOKLYN, N. Y., Cor. 13th St. and 3d Ave.
HAMBURG, GERMANY, Auf dem Sande 1.
OAK LEATHER TANNERIES, Bristol, Tenn.

THE PARKER-RUSSELL MINING AND MFG. CO.,

Saint Louis, Missouri. **New York Office, 45 Broadway.**

Gas Retort Benches.
Longest life—largest output per retort—lowest fuel results—greatest ease of operation.
Water Gas Linings.
Fiddes-Aldridge Discharging Charger.
Large stock of retorts and settings on hand.
All our wares are manufactured at our own plant from clays mined at our mines.

All contracts made as of St. Louis. Correspondence Solicited.

THE HUMPHREY GAS ARC LAMP.

Designed, Developed and Distinguished as

"THE GAS COMPANY'S LAMP,"

Has been one of the most conspicuous successes of the past decade in lighting lines. The competing lamps that were brought out in scores during the earlier days had but a brief life and exist to-day principally as unpleasant memories of ill-considered purchases. **Is not the same thing about to be repeated with Inverted Gas Arc Lamps?**

Adopt the **Humphrey Inverted** as your standard and be insured and protected by the strongest, most liberal and progressive gas lighting organization in the world.

GENERAL GAS LIGHT CO.,

Kalamazoo. New York. San Francisco.
London, England. Bremen, Germany. Wellington, New Zealand.

PRACTICAL HANDBOOK ON

GAS ENGINES,

With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author, GEO. M. RICHMOND, M.E.

PRICE, $1.00.

FOR SALE BY

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

Whether you buy Ironclads or not, you owe it to yourself to investigate them.

We could make a cheaper meter than the Ironclad -- but we would then have competition.

Ironclad CAST IRON DRY Gas Meters

The accuracy, durability and uniformity of Ironclad Meters is the result of years of careful and costly experimenting by the most able engineers, to produce a meter that would meet the requirements of gas companies whether their gas be

NATURAL, ARTIFICIAL OR ACETYLENE.

All the care, skill and experience put into the manufacture of the Ironclad Meter is not a matter of additional cost--TO YOU. We would rather do the experimenting in our factory than leave it for you to do.

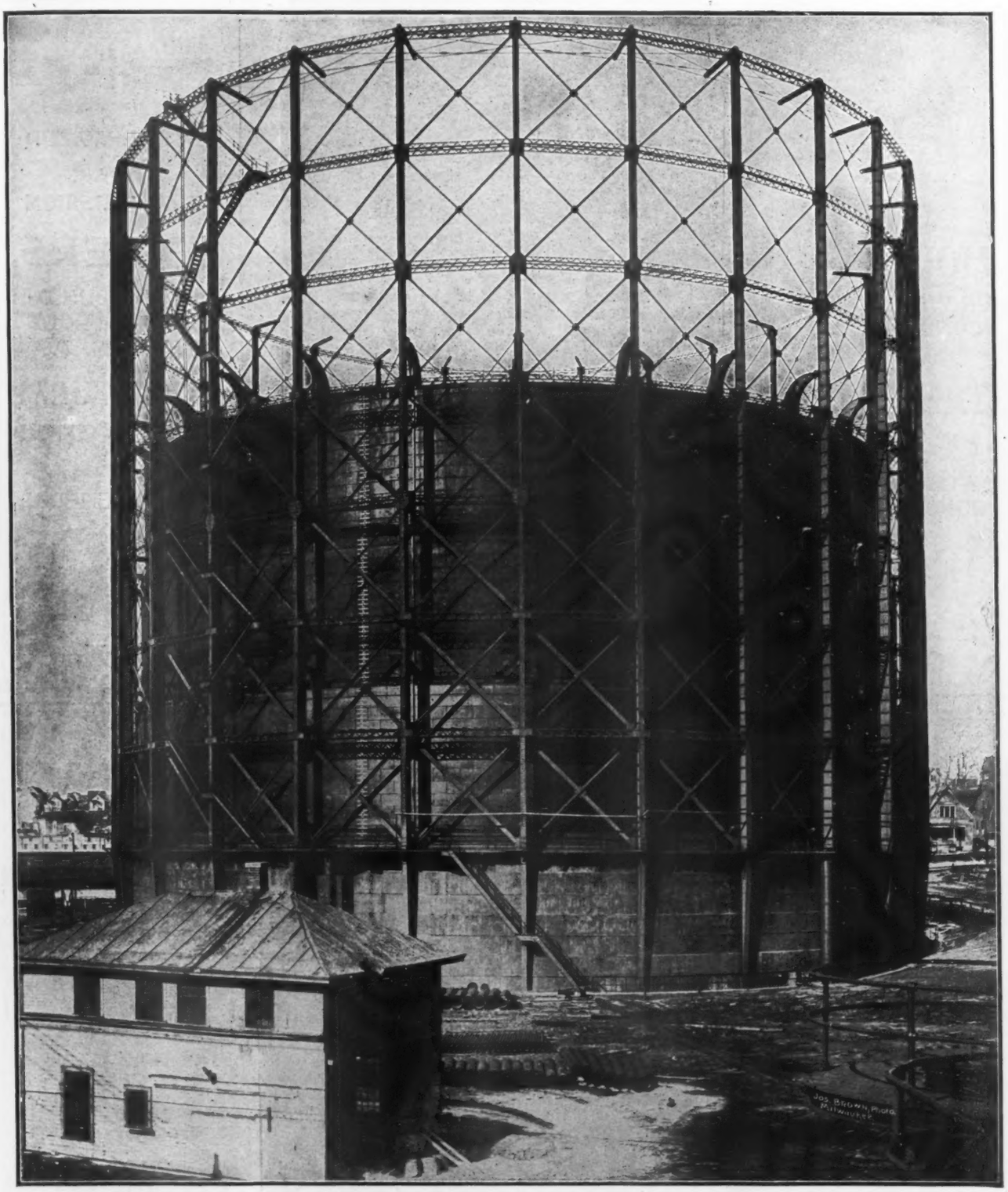
CATALOG 100 FREE

Pittsburg Meter Company

NEW YORK, 149 Broadway.
CHICAGO, 256 Madison Street.
KANSAS CITY, 6 West Tenth Street.
MINNEAPOLIS, 409-411 Second Avenue, S.

General Office and Works, East Pittsburg, Pa.

MANUFACTURERS OF GAS METERS AND WATER METERS.



The Largest Steel Tank Gasholder in the World, 225 Feet 9 Inches Diameter, 35 Feet Deep, Five Lifts.

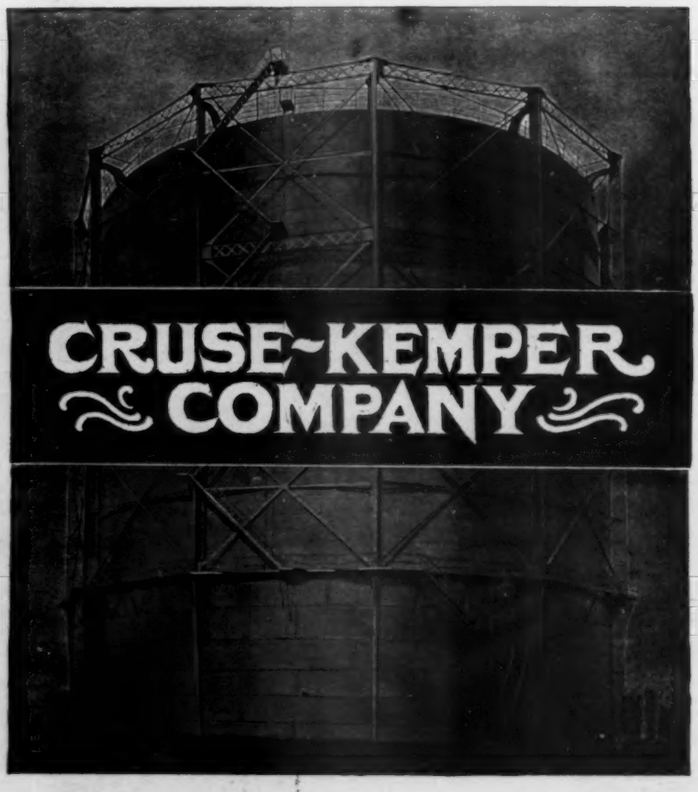
RITER-CONLEY MFG. CO.,

PITTSBURGH.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

COMPLETE COAL GAS PLANTS.

GAS ENGINEERS,
BUILDERS OF
GAS HOLDERS,
PURIFIER BOXES,
CONDENSERS,
SCRUBBERS,
STEEL TANKS,
PLATE METAL CONSTRUCTION.



CRUSE-KEMPER COMPANY

STEEL WATER AND TRANSMISSION TOWERS.
STEEL BUILDINGS and ROOF TRUSSES.
STRUCTURAL IRON & STEEL WORK IN GENERAL.

OFFICE AND WORKS, - - - - AMBLER, PA.

J. S. DeHART, JR., PRESIDENT
A. F. WEHNER, SECRETARY
R. K. WEHNER, TREASURER

ISBELL-PORTER COMPANY

GAS ENGINEERS & BUILDERS OF GAS WORKS

BENCH WORK
CHARGING AND DISCHARGING MACHINERY
MACKENZIE EXHAUSTERS
PRIMARY AND SECONDARY CONDENSERS FOR FRESH OR SALT WATER

ISBELL VALVES SPECIALS
TAR EXTRACTORS
P. & A. TAR EXTRACTORS FOR WATER GAS
ROTARY AMMONIA SCRUBBERS
SHAVING SCRUBBERS PURIFIERS STREET GOVERNORS

MAIN OFFICE AND WORKS
BRIDGE & OGDEN STREETS
NEWARK, N. J.
ESTABLISHED 1865

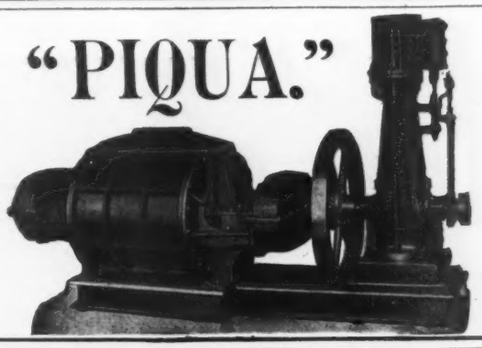
GAS EXHAUSTERS AND BLOWERS.

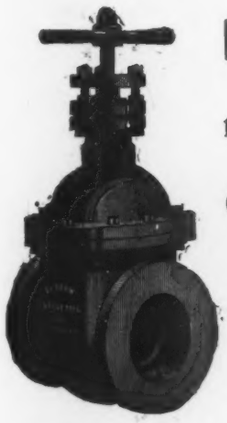
We have a full line of sizes for all standard pressures. The design, material and workmanship is A-1. Prompt Delivery and Reasonable Prices. WHY NOT give us YOUR requirements?

THE PIQUA BLOWER CO.,

PIQUA, OHIO.

"PIQUA."





THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

QUINTARD IRON WORKS CO.,

Foot of Twelfth Street and East River, New York,

BENCH WORK,
CONDENSERS,
SHAVING SCRUBBERS,
CAST IRON FLANGED PIPE,
RIVETED STEEL PIPE.

FREDERICK W. FLOYD, Engineer.

ESTABLISHED 1866.

HENRY MAURER & SON,

Manufacturers of

High Grade Firebrick, Blocks, Tiles,

ETC.,

Works: Maurer, N. J. Office: 420 E. 23d St., N. Y. City.

L. C. Hamlink, President *Geo. F. Vater, Engineer and Chemist* *August Court, Secretary*

GAS BENCH CONSTRUCTION CO.

ST. LOUIS, MO.

ENGINEERS AND BUILDERS

OF COAL GAS BENCHES

"BETTER BENCHES"

All Workmanship, Material and Results Guaranteed.

16 YEARS EXPERIENCE DESIGNING, BUILDING AND OPERATING BENCHES

All Retorts and Settings Manufactured under the supervision of Our Own Chemist and Engineer

We make a special High Grade Water Gas Lining Material and Checker Brick

PRACTICAL HANDBOOK ON GAS ENGINES, WITH INSTRUCTIONS FOR CARE AND WORKING OF THE SAME.

By G. LIECKFELD, C.E. Translated with Permission of the Author, by GEORGE M. RICHMOND, M.E. Price, $1.

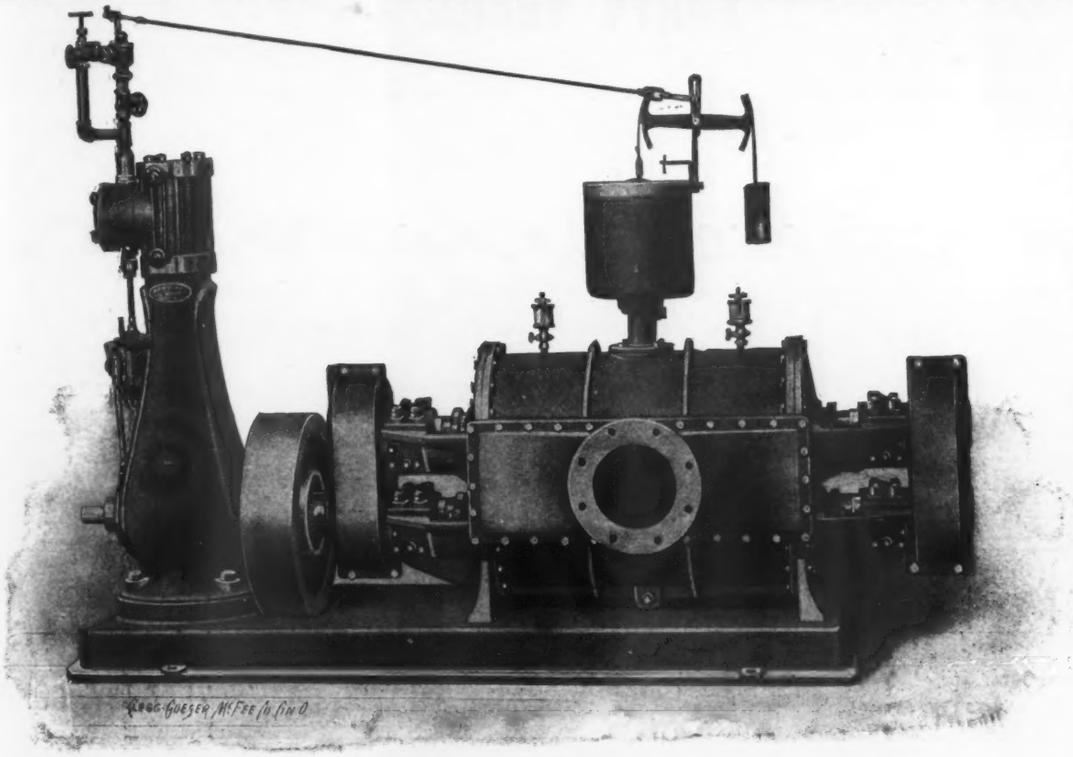
For Sale by AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

EVENS & HOWARD FIRE BRICK CO

"STAR" RETORTS. GAS WORKS DIVISION, - A. S. B. LITTLE, Engineer.

SAINT LOUIS · MISSOURI

50TH ANNIVERSARY.
ROOTS' GAS EXHAUSTERS.



Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

Write for Catalogue.

P. H. & F. M. ROOTS COMPANY,

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Bldg.

SEND FOR POCKET EDITION OF "ENGINEERS' PRACTICAL REFERENCE BOOK."

GAS BLAST FURNACES
—AND—
HEATING MACHINES
—FOR—
INDUSTRIAL PURPOSES.

STATE

AMOUNT . . . . . OF
SIZE . . . . . OF
KIND . . . . . OF

WORK TO BE DONE IN GIVEN TIME.

AMERICAN GAS FURNACE COMPANY,

24 JOHN STREET, · · · NEW YORK, N. Y.

CATALOGUE SENT ON APPLICATION.

BRAY BURNERS HAVE BEEN USED FOR MORE THAN FORTY YEARS.

In that time they have been recommended and used by the leading gas experts, endorsed by the U. S. Government Inspectors of Gas, as well prominent State Inspectors.

To-day the Bray is the only high-grade, absolutely reliable open flame burner on the market.

W. M. CRANE COMPANY,

16, 18 and 20 West 32d Street, New York,

SOLE AGENTS FOR GEO. BRAY & CO., LEEDS, ENGLAND.

GEORGE ORMROD, Pres & Treas. JOHN D. ORMROD, Supt.
J. G. EBERLEIN, Secretary.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

TRADE MARK

BRISTOL'S

REG. U. S. PAT. OFFICE.

RECORDING GAUGES

For All Commercial Ranges of

PRESSURE AND VACUUM.

Write for New Preliminary Bulletin No. 104.

BRANCH OFFICES: { New York. Chicago.

THE BRISTOL CO., WATERBURY, CONN.

EVERYONE INTERESTED IN GAS MATTERS

Should have a Copy of our 50th Anniversary Number (Price, 50c.), Containing the Following Articles:

Four Men whose Work in Fraternizing the Gas Industry was of the Pioneer Type. Arthur E. Boardman.

Gas Association Work and its Influence in and on the Gas Industry for the Last Half Century. George G. Ramsdell.

A Rapid Review of Gas Manufacture in New York City for the Last 50 Years. Dr. A. H. Elliott.

Fifty Years of Street Lighting in the City of New York. H. Thurston Owens.

Historical Notes Respecting the Development of the Last Half Century in the Gas Business of the Pacific Coast. John A. Britton.

Processes I Have Known. Frederic Egner.

Fifty Years' Progress in the Gas Industry in Canada. William H. Pearson.

Progress of the Gas Industry of Great Britain in the Last 50 Years. N. H. Humphrys.

Gas Coals of America. James D. Perkins.

A Half-Century History of Water Gas. F. N. Morton.

The Development of the Public Utilities Commissions as Applied to the Gas and Electric Business. C. J. Russell Humphreys.

A Half-Century's History of Gaseous Fuel as Applied to Heating Gas Retorts. F. Bredel.

Systems of Vertical Retorts. Fred. J. Mayer.

Development of the Ammonia Industry in Gas Works during the Last 50 Years. R. W. Hilgenstock.

Residuals, Some History of. Carroll Miller.

Meters and Meter Makers. D. McDonald.

Progress in Electric Current Development in the Artificial Lighting Field. A. F. Ganz.

Development of the New Business Division of the Gas Industry during the Last 50 Years. Philmer Eves.

Growth and Value of Demonstration Work in the Household of Gaseous Fuel. Helen Armstrong.

"Uncle Jerry" in Reminiscent Mood. J. B Howard.

Present-Day Photometrical Practice. W. H. Gartley.

The Boston Gas Supply during 50 Years. William McKay.

Development in Pipe Manufacture. George W. Whyte.

Public Utility Commissions. Rufus C. Dawes

Heating Machines. E. P. Reichhelm.

Practical Handbook on

GAS ENGINES,

With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author.

By GEO. M. RICHMOND, M.E.

Price, $1. *For Sale by*

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

ELECTRIC GAS LIGHTING.

How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

By H. S. NORRIE.

Price, 50 cents. Orders may be sent to

A. M. CALLENDER & CO., 42 PINE ST., N. Y. CITY.

Alcohol, its Manufacture from Farm Products and De-Naturing. By F. B. WRIGHT.

Price, $1. *For Sale by*

A. M. Callender & Co., 42 Pine St., New York City.

Modern Machine Shop Construction, Equipment and Management, by OSCAR E. PERRIGO, M.E.

Price, $5. For Sale by

A. M. CALLENDER & CO., 42 Pine St., New York City.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

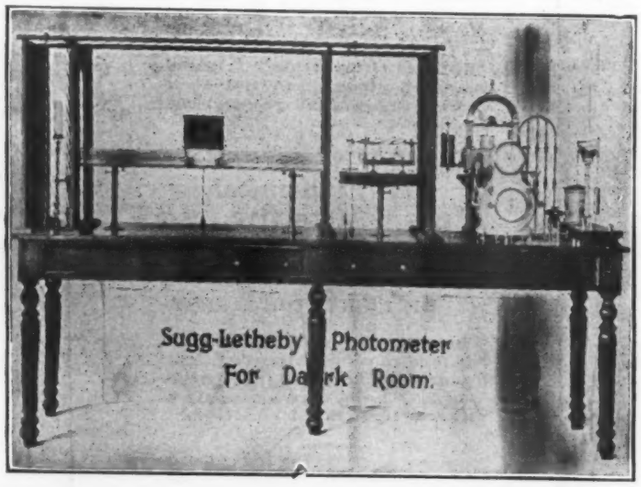
OCTOBER, 1909.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Extinguish.
Fri.	1	6.10PM	8.20PM
Sat.	2	6.10	8.50
Sun.	3	6.10	9.30
Mon.	4	6.10	10.20
Tue.	5	6.10LQ	11.10
Wed.	6	6.10	12.10AM
Thu.	7	6.10	1.10
Fri.	8	6.10	2.20
Sat.	9	6.10	3.20
Sun.	10	6.00	5.10
Mon.	11	6.00	5.10
Tue.	12	6.00	5.10
Wed.	13	6.00NM	5.10
Thu.	14	6.00	5.10
Fri.	15	6.00	5.10
Sat.	16	6.00	5.10
Sun.	17	5.50	5.20
Mon.	18	6.50	5.20
Tue.	19	7.30	5.20
Wed.	20	8.20	5.20
Thu.	21	9.20LQ	5.20
Fri.	22	10.30	5.20
Sat.	23	11.40	5.20
Sun.	24	1.00AM	5.20
Mon.	25	2.10	5.20
Tue.	26	3.30	5.20
Wed.	27	No L.	No L.
Thu.	28	No L.FM	No L.
Fri.	29	No L.	No L.
Sat.	30	5.30PM	7.20PM
Sun.	31	5.30	8.10

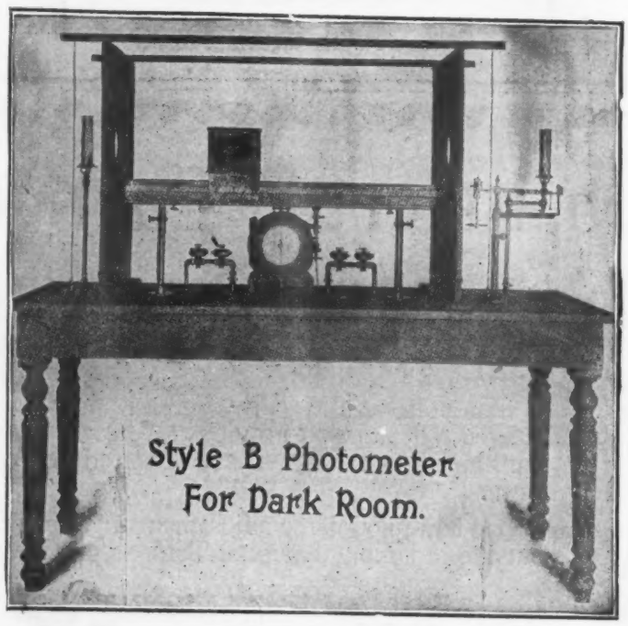
TOTAL HOURS DURING 1909.

By Table No. 1.

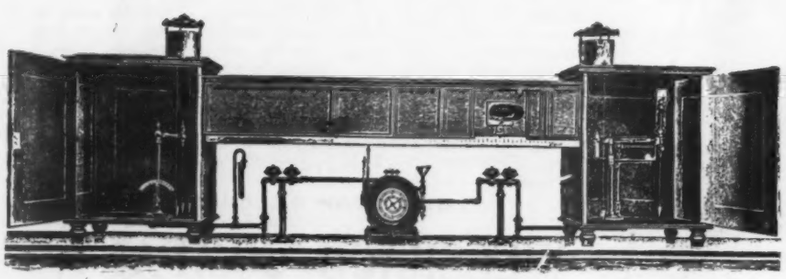
	Hrs.Min.
January	212.20
February	183.40
March	173.00
April	151.10
May	144.10
June	138.50
July	145.40
August	160.30
September	180.00
October	201.00
November	216.30
December	233.40
Total, yr.	2140.30



Sugg-Liethe by Photometer For Dark Room.



Style B Photometer For Dark Room.



Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

OCTOBER, 1909.

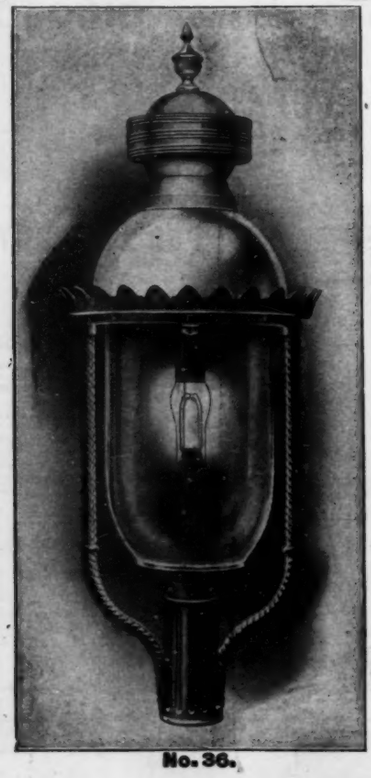
Day of Week.	Date.	Table No. 2. New York City. All Night Lighting. Complete Lighting in One Hour From Time Given P. M	Complete Extinguishing in 50 Minutes From Time Given A.M.
Fri.	1	5.22	4.42
Sat.	2	5.22	4.42
Sun.	3	5.22	4.42
Mon.	4	5.22	4.42
Tue.	5	5.22	4.42
Wed.	6	5.22	4.42
Thu.	7	5.22	4.42
Fri.	8	5.12	4.52
Sat.	9	5.12	4.52
Sun.	10	5.12	4.52
Mon.	11	5.12	4.52
Tue.	12	5.12	4.52
Wed.	13	5.07	4.52
Thu.	14	5.07	4.52
Fri.	15	4.57	5.02
Sat.	16	4.57	5.02
Sun.	17	4.57	5.02
Mon.	18	4.57	5.02
Tue.	19	4.57	5.02
Wed.	20	4.57	5.02
Thu.	21	4.57	5.02
Fri.	22	4.47	5.07
Sat.	23	4.47	5.07
Sun.	24	4.47	5.07
Mon.	25	4.47	5.07
Tue.	26	4.47	5.07
Wed.	27	4.47	5.07
Thu.	28	4.47	5.07
Fri.	29	4.37	5.17
Sat.	30	4.37	5.17
Sun.	31	4.37	5.17

TOTAL HOURS DURING 1909.

	Hrs.Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 min. extinguishing time	30.25
Total, yr.	3950.00

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY



No. 36.

....OF AMERICA....

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

Welsbach Inverted Portico Lamps

No. 901. INVERTED PORTICO LAMP. Single Burner.

For all semi-exposed places—porticos, entrances, etc. simple in construction, few parts; exterior made of enameled steel, interior parts of heat-resisting material that are practically indestructible. Wind, storm and insect proof.

The globes on designs No. 901 and No. 902 are supported in a flanged reflector that provides for heat expansion. The reflector being hinged, it can readily be lowered for cleaning or trimming the lamp.

Gas and pilot-flame adjustment by means of needle valves from outside of lamp. The pilot-flame is protected and will not blow out.

Three Styles from which to Choose:

No. 902.

Equipped with No. 5 clear globe and steel enameled reflector 8¾ inches in diameter and 1½ inches deep. Finish, dark green enamel.

Dimensions: Length over all, 16 inches; diameter of globe, 5 inches; depth of globe, 4 inches. List price, complete, without mantles... $8 00

No. 900.

Equipped with 7 inch alabaster or sand-blast ball globe. Finish, dark green, or white and gold enamel. Dimensions: Length over all, 17½ inches.

White and gold enamel. List price, without mantles..... $9.00

Dark green enamel. List price, without mantles..... $8.00

No. 901.

Same as 902 portico lamp, except steel enameled reflector, which is flat, and 10 inches in diameter.

List price, complete, without mantles..... $8.00

WRITE FOR DISCOUNTS.

WELSBACH COMPANY,

Gloucester, N. J. —FACTORIES— Columbus, Ohio.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

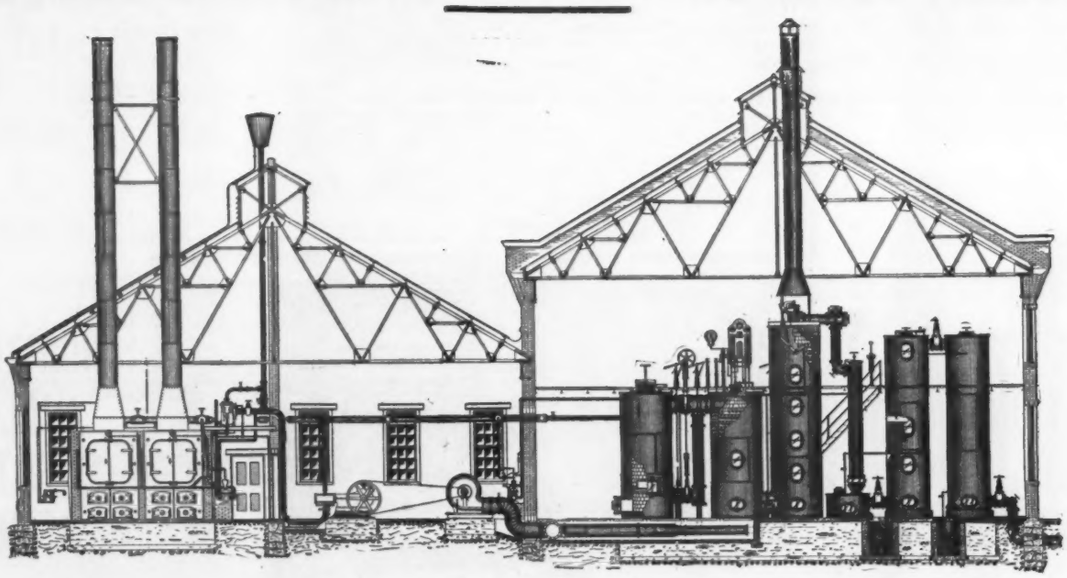
LESSEES, OPERATORS AND BUILDERS OF **GAS WORKS.**

Largest Builders of CARBURETTED WATER GAS PLANT IN AMERICA.

SOLE AMERICAN BUILDERS

OF THE

Standard Double-Superheater Lowe Water Gas Apparatus.



TOTAL SETS INSTALLED TO JULY 1, 1909, ... 704
TOTAL DAILY CAPACITY TO JULY 1, 1909, ... 577,440,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
Straight Standpipe Cleaners.
Waste Heat Boiler.
Hygrometer.
Meters for Regulating Air and Steam Supply to Water Gas Apparatus.

Established 1858. Incorporated 1890.

CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas. H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. NEW CASTLE, PA.

In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD,
29 North Mill St., New Castle, Pa.

KRATER-DINAS RETORT CEMENT.

Universally accepted to be the best cement for patching and repairing retorts, making up bench work, etc. Advantages: Powdered form; only mix with water; no waste; too much mixed, apply water and use the next time; adheres very easy; does *not* fall out by decarbonization. We guarantee or take back. Many re-orders and recommendations from America, Germany, France, Belgium, etc. Write for price and testimonials.

STRASSBURGER BROS., Sole Importers,
563 Lincoln Avenue, Chicago, Ills.

"BEST BY TEST."

ESTABLISHED 1868.

L. N. RANCKE, V. Pres. & Mgr. E. L. RIEHA, Engineer.

BALTIMORE RETORT & FIRE BRICK COMPANY.

COAL GAS BENCHES.

HORIZONTAL RETORTS.
INCLINED RETORTS.
VERTICAL CHAMBERS.

WALDO BROS., 102 Milk St., BOSTON, MASS.,
NEW ENGLAND AGENTS.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

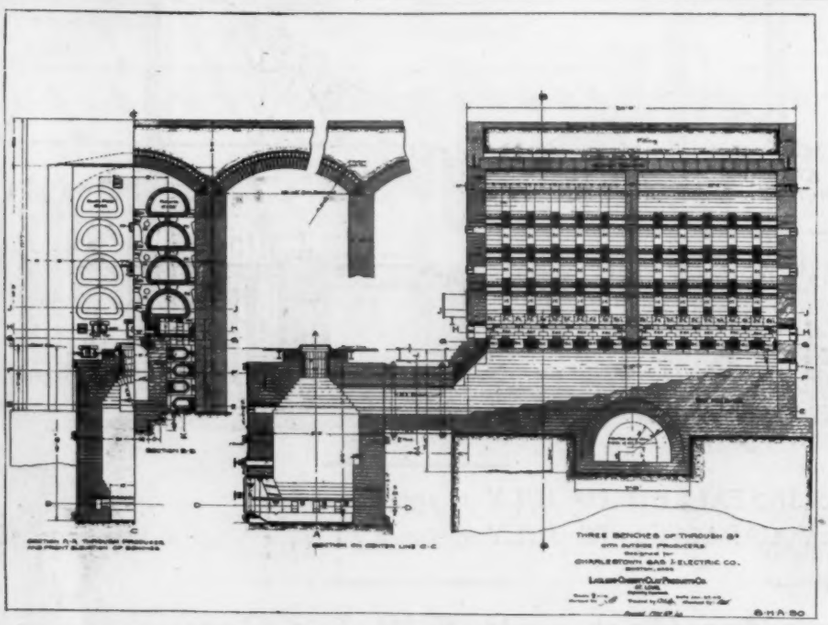
Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office: *411 Olive Street, Continental Bank,* ST. LOUIS, MO.

OUR REPUTATION IS OUR GUARANTEE.



HORIZONTAL, INCLINED, VERTICAL BENCHES.

BENCHES OF THROUGH EIGHTS,

WITH RETORTS 20 FEET LONG AND OUTSIDE PRODUCERS, NOW BEING ERECTED FOR

CHARLESTOWN GAS AND ELECTRIC CO., MASSACHUSETTS,

BY

"LACLEDE-CHRISTY,"

ST. LOUIS, MO.

EXPERT INSPECTION of Holders and Other Structures During Construction.
ECONOMIC DESIGN of Steel Structures, Reinforced Concrete, Masonry and Foundations.

CHAMBERS & HONE, Consulting Engineers, ... 1 Liberty Street, New York City.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada, Detroit, Seattle, Rochester and St. Louis.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich., and Cincinnati, Ohio. These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot **Coke Conveyor, Quencher and Steam Exhauster,** operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

G. A. BRONDER,
Contracting Engineer and Builder,
229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,

Automatic, Balance, High Pressure and Service Governors,
Unison Telemetric Pressure Gauge,

Iron Sponge, Purifying Material for Gas Purification, Manufacturers of Jones Jet Photometers, The National Smoke and Ammonia Helmet, Sulphur Testers, High and Low Pressure House Governors. . . . . .

Wide Experience In High Pressure Installation and Extension.

PACIFIC COAST AGENT: VAN E. BRITTON, SAN FRANCISCO, CAL.

50 CHURCH ST., NEW YORK CITY.
295 WEST 22D ST., CHICAGO, ILLS.

12-Inch High Pressure Governor.

REYNOLDS' GAS REGULATOR COMPANY,

ANDERSON, IND., U. S. A.

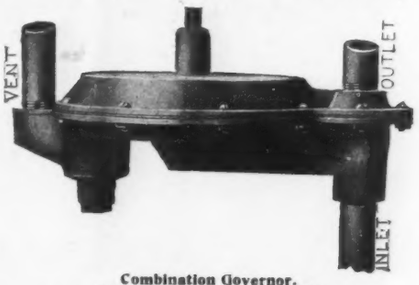
We make all sizes for all classes of reduction,

Double and Single District Stations,
And Individual Service Governors for Reducing High Pressure.

HOLDER GOVERNORS
And Low Pressure Regulators, all of the Dry Diaphragm type.

English Agents:
THE BRYAN DONKIN CO., LTD., Chesterfield, England.

Write for Catalog.



Combination Governor.
(Governor and Mercury Seal.)

Newbigging's Handbook for Gas Engineers and Managers.

Price, $6.50. For Sale by
A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.

COAL TAR AND AMMONIA,

By GEORGE LUNGE, PH.D. Third and Enlarged Edition.
Price, $15. For Sale by
A. M. CALLENDER & CO., 42 Pine Street, New York City.

JAMES D. PERKINS, President. F. SEAVERNS, Treasurer.

THE PERKINS COMPANY,

228 and 229 Produce Exchange, New York City.

OCEAN MINE YOUGHIOGHENY GAS COAL,
OLD KENTUCKY SHALE AND O. K. BOGHEAD.

BERWIND-WHITE COAL MINING COMPANY'S

Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming. .

A. C. M. AZOY, General Agent, 1 Broadway, New York.

PETER YOUNG, President. Works, LOCKPORT STATION, PA.

ESTABLISHED 1864.

JAMES GARDNER, JR., CO.,

Successor to WILLIAM GARDNER & SON.

N. A. YOUNG, Secretary and Treasurer. Address all communications to JAMES GARDNER, JR., CO., Bolivar, Pa.

Fire Clay Goods for Gas Works.

Double Gate Valves.

A LARGE STOCK ON HAND READY FOR PROMPT SHIPMENT.

These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.....	8 inches	10 inches	12 inches	16 inches	20 inches	24 inches	30 inches	36 inches
Diameter of flanges....	13 inches	16 inches	18 inches	22½ inches	27 inches	31 inches	31½ inches	44 inches
Face to face of flange...	12 inches	12 inches	12 inches	14 inches	17 inches	20 inches	21 inches	25½ inches

For price and other information, apply to

THE CONTINENTAL IRON WORKS,
P. O. STATION G. NEW YORK (BOROUGH OF BROOKLYN).

Directory of American Gas Companies, 1909.

Price, $5.00.
For Sale by
A. M. Callender & Co., 42 Pine St., N. Y.

KELLER ADJUSTABLE COKE CRUSHER.

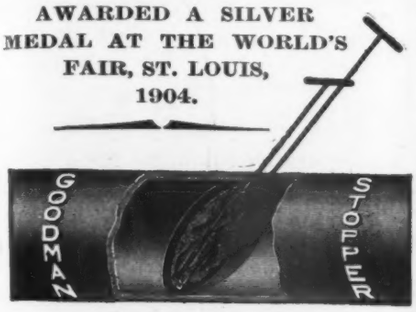
Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER,

Columbus, Ind.

Correspondence Solicited.

AWARDED A SILVER MEDAL AT THE WORLD'S FAIR, ST. LOUIS, 1904.



AGENTS.

Pacific Coast—VAN E. BRITTON, 269 Monadnock Building, San Francisco, Cal.

Great Britain—PARKER & LESTER, Old Kent Road, London.

MANUFACTURED BY

SAFETY GAS MAIN STOPPER CO.,

257-263 East 133d Street,

NEW YORK CITY.

PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C.

Send for Pamphlet on Patents.

EDMUND H. McCULLOUGH, President. H. C. ADAMS, 1st Vice-President. CHAS. F. GODSHALL, 2d Vice-Pres. & Treas. HENRY WHARTON, Secretary. C. B. NICHOLS, Assistant Secretary.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J., WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

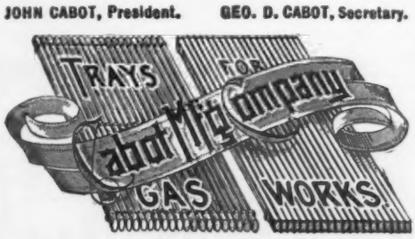
GAS MAINS—SERVICE PIPES.

Their installation for High or Low Pressure is the work in which we have specialized for years. Because of our Facilities and Experience, many Gas Companies prefer to contract with us for such work, rather than to execute it themselves. It proves to be as cheap in the end. We solicit inquiries.

Telephone Connection.

SULLIVAN BROS.,
11 Main St., Flushing, N. Y.

JOHN CABOT, President. GEO. D. CABOT, Secretary.



1412-1428 Adams Street, Hoboken, N. J.

PURIFIER AND SCRUBBER TRAYS.

Church's Patent Trays,

Reversible; Strongest; Most Easily Repaired.

We also Supply the Cheapest and Strongest

Reversible Bolted Trays.

Special Trays for Iron Oxide in Either Style.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
DAYTON, O.

AMERICAN GAS ENGINEERING PRACTICE,

A HANDBOOK FOR ALL ENGAGED IN THE INDUSTRY,

Comprising Many Details Not Heretofore Published,

By M. NISBET LATTA, C.E.,

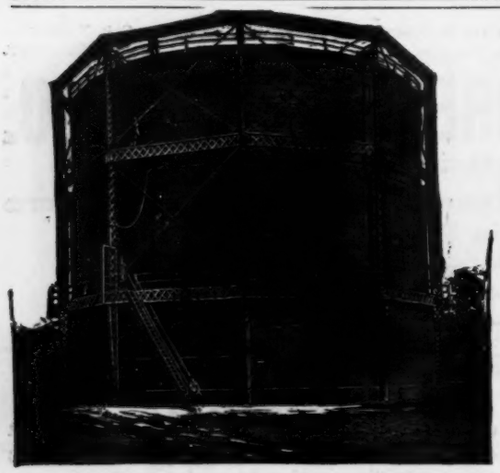
PART I. WATER GAS MANUFACTURE. The Generator. The Carburetter. The Superheater. Wash Box and Tar. Scrubbers. Condensers. Purifiers. Exhausters. Station Meters. Holders. Details of Works' Operation.

" II. GAS DISTRIBUTION. Naphthaline. Mains. Services. Consumers' Meters. Pressure. House Piping. Appliances.

" III. GENERAL TECHNICAL DATA. Properties of Gases. Steam. Mathematical Tables. Conversion Factors. Pipe and Miscellaneous Data.

Price, $4.50. For Sale by

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.



DAVIS & FARNUM MFG. CO.,

Principal Office and Works, Waltham, Mass.

Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

H. M. BYLLESBY & COMPANY

(INCORPORATED).

GAS ENGINEERS,

DESIGN, CONSTRUCT AND OPERATE
COMPLETE COAL, WATER AND CRUDE OIL GAS PLANTS.

EXAMINATIONS AND REPORTS.

DEARBORN & MONROE STS., CHICAGO.

Oklahoma City, Okla. Mobile, Ala. San Diego, Cal.

ALEX. C. HUMPHREYS, President.
WM. W. RANDOLPH, Vice-President.
EMILE GUILLAUDEU, Treasurer.
ROBT. O. LUQUEER, Secretary.
HOWARD E. WHITE, General Counsel.

EUROPEAN CORRESPONDENTS.
HUMPHREYS & GLASGOW,
LONDON. — BRUSSELS.

HUMPHREYS & GLASGOW, INC.,

CONSULTING ENGINEERS.

ADVICE AS TO EXTENSION, MANAGEMENT AND RECONSTRUCTION OF GAS AND ELECTRIC PLANTS.

COMPLETE EXAMINATIONS MADE. ~ ~ ~ PROPERTIES PURCHASED.

CITY INVESTING BUILDING, 165 BROADWAY, NEW YORK.

HENRY I. LEA,

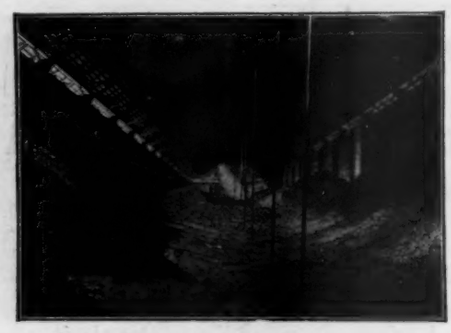
GAS ENGINEER.

DESIGN, CONSTRUCTION AND MANAGEMENT OF GAS PLANTS.

EXAMINATIONS AND REPORTS.

THE ROOKERY, CHICAGO.

Coal and Coke Elevating and Storage Plants.



Coal Storage Building of the Lowell Gas Company, Mass. THE VERTICAL PIPES THAT SHOW SO PROMINENTLY IN THE ENGRAVING EACH CARRY A THERMOMETER, WHICH GIVES WARNING OF A RISE IN TEMPERATURE.

"Hunt" Noiseless Conveyor.

McDonald-Mann Quenching Chutes.

Bulletin B-1 describes our Machinery. Copy sent on receipt of a post card.

Designed and Manufactured by the C. W. HUNT COMPANY (Established 1872).

General Offices and Works: WEST NEW BRIGHTON, NEW YORK. NEW YORK OFFICE, 45 BROADWAY.

FIELD'S ANALYSIS FOR THE YEAR 1907.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland; being the 30th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., N. Y. City.

The Bartlett-Hayward Company,

Baltimore, Md. 100 Broadway, New York.

GASHOLDERS,

Coal and Water Gas Plants.

Western Representative: W. A. BAEHR, Commercial National Bank Building, Chicago, Ills.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS
AND STEEL TANKS,

Latest Improved

ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, {FORT WAYNE, IND.

R. D. WOOD & CO.,

400 CHESTNUT ST., PHILADELPHIA,

MANUFACTURERS OF

Cast Iron Pipe.

HEAVY LOAM CASTINGS,

Dunham Specials,

Hydraulic Work,

LAMP POSTS, VALVES, ETC.,

Gas Power Plants with Producers.

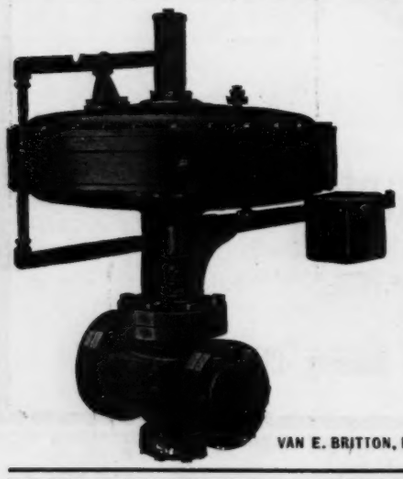
BUILDERS OF

Gasholders.

Single or Multiple Lifts, with or without Metal Tanks.

PURIFIERS, CONDENSERS, SCRUBBERS, BENCH WORK.

Cutler's Patent Freezing Preventer for Holder Cups.



THE FULTON GAS PRESSURE GOVERNORS

For Artificial or Natural Gas.

For District or Individual Service.

Our Improved **Duplex Sensitive Governor** for district service will reduce high pressure gas to inches of water without variation. Absolutely safe and reliable. No complicated mechanism to get out of order. No auxiliary regulators or other devices to assist the main governor required. The most simple and perfect governor ever placed on the market. We also manufacture Holder Governors, Compressor Governors and Individual Service Governors for any inlet and outlet pressure.

More than 20 years' experience with the largest gas companies. Send for Catalog.

THE CHAPLIN-FULTON MFG. CO.,

VAN E. BRITTON, Pacific Coast Agent, Monadnock Bldg., San Francisco, Cal. 28-34 PENN AVE., PITTSBURGH, PA

COAL TAR AND AMMONIA.

THIRD AND ENLARGED EDITION.

BY

GEORGE LUNGE, PH.D.

Price, $15. For Sale by

A. M. CALLENDER & CO., - - 42 Pine Street, New York City.

THE GAS ENGINEER'S POCKET-BOOK,

By HENRY O'CONNOR,

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works.

PRICE, $3.50.

FOR SALE BY

A. M. CALLENDER & CO., - No. 42 Pine Street, New York City.

THE STACEY MANUFACTURING COMPANY
CINCINNATI.

GAS ENGINEERS, DESIGNERS AND BUILDERS.

Roofs and Structural Steel Work.
Condensers, Washers, Extractors, Purifiers.
Bench Iron, General Cast Iron Work.

GAS HOLDERS

Oil, Water and Storage Tanks of Every Description.
Valves, Cast Iron Fittings and Specials.
Stacks, Stand Pipes, Etc., Etc.

"CHOLLAR'S" PATENTED SYSTEM OF GAS PURIFICATION.

WESTERN OFFICE: - 718 Mission St., San Francisco, Cal.

THESE BOOKS ARE NEW.

LIQUID AND GASEOUS FUELS, By Vivian B. Lewes. 334 pages. . . . . Price, $2.

THE GAS ENGINE, By Forrest R. Jones. 447 pages and 142 cuts. Price, $4.

HEATING, By W. J. Baldwin. Price, ... $2.50.

PUBLIC LIGHTING BY GAS and ELECTRICITY, By W. J. Dibdin. 528 pages. About 150 illustrations. Price, . . $8.

HEAT, ENERGY AND FUELS, By Oskar Nagel. 306 pages and 118 illustrations. Price, $3.

PRODUCER GAS AND GAS PRODUCERS, By Samuel S. Wyer. 295 pages. Price, $4.

LAW AND BUSINESS OF ENGINEERING AND CONTRACTING, By Charles E. Fowler. Price, $2.50.

THE MACBETH CALCULATOR of Handy Formulas for Illumination. Price, ... $4.50.

GAS PIPING AND GAS LIGHTING, By W. P. Gerhard. 310 pages. . . . . Price, $3.

GAS POWER, By F. E. Junge, M.A., C.E., M.E. 548 pages. . . . . Price, $5.

GAS, GASOLINE AND OIL ENGINES, Including Producer Gas Plants. By Gardner D. Hiscox, M.E. Price, $2.50.

PRACTICAL TESTING OF GAS AND GAS METERS, By C. H. Stone. Price, ... $3.50.

STANDARD WORKS.

GAS MANUFACTURE, By W. J. A. Butterfield. Price, ... $2.50.

HANDBOOK ON GAS ENGINES, By G. E. Lieckfeld, C.E. Translated by George M. Richmond, M.E. Price, $1.

GAS AND GAS WORKS, By Hughes and O'Connor. Price, ... $2.50.

CHEMISTRY OF GAS MANUFACTURE, By Harold M. Royle, F.C.S. Price, ... $4.50.

GAS MANUFACTURE FOR STUDENTS, By John Hornby. Price, ... $1.50.

COAL TAR AND AMMONIA, By George Lunge. Price, ... $15.

GAS ANALYST'S MANUAL, By Jacques Abady. Price, ... $6.50.

SELF-INSTRUCTION FOR STUDENTS, Elementary, Advanced, Constructional. Price, ... Each, $1.50.

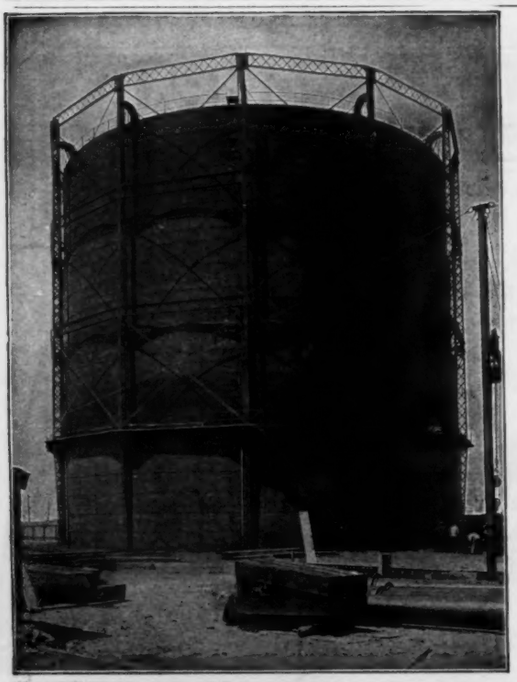
THE CALORIFIC POWER OF FUELS, By Herman Poole. Price, ... $3.00

MODERN RETORT SETTINGS, By G. P. Lewis. Price, ... $1.50.

ART OF ILLUMINATION, By Dr. Louis Bell. Price, ... $2.50.

GAS COMPANIES' BOOKKEEPING, By Brearley and Taylor. Price, ... $4.50.

We will be Glad to Furnish Any Engineering Book.
SEND CHECK, DRAFT, POST OFFICE or EXPRESS MONEY ORDER.
AMERICAN GAS LIGHT JOURNAL - - 42 PINE STREET, NEW YORK CITY.



JOHN FOWLER, President. J. SCOTT FOWLER, Vice-Pres. & Treas.

DEILY & FOWLER MFG. CO.,

39 Laurel Street, Philadelphia, Pa.

ESTABLISHED 1842. INCORPORATED 1908.

BUILDERS OF

GASHOLDERS,

Single-Lift or Telescopic,

With or Without Steel Tanks.

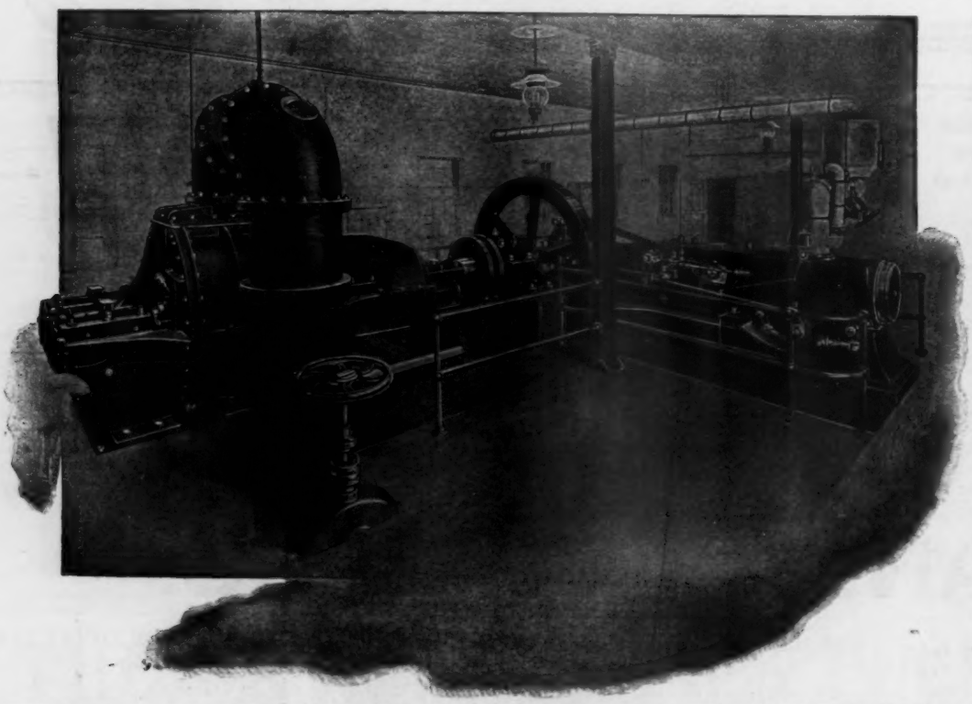
Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.

CONNERSVILLE GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS.



THIS cut shows one of our High Pressure machines and a 4-valve engine connected by one of our leather link flexible couplings. Two of these units were installed for the Peoples Gas Light and Coke Co., Chicago, at their 73d St. Station. Each machine has a capacity of 14,000,000 cubic feet per day.

—o—

We also manufacture

GAS VALVES,
BY-PASS VALVES,
PRESSURE REGULATORS,
ETC., ETC.

Correspondence Solicited.

THE CONNERSVILLE BLOWER COMPANY,

Connersville, Indiana, U. S. A.

NEW YORK OFFICE, 50 Church Street. - CHICAGO OFFICE, 536 Monadnock Bldg.

Newbigging's Handbook for Gas Engineers and Managers.

PRICE, $6.50.

For Sale by

AMERICAN GAS LIGHT JOURNAL, - 42 Pine St., New York City.

D. McDONALD & CO.,

971-997 BROADWAY, ALBANY, N. Y.,

MANUFACTURERS OF

DRY GAS METERS, STATION METERS, PREPAYMENT METERS, METER PROVERS AND GAUGES.

THE GLOVER PREPAYMENT METER,

Simple, Strong, Satisfactory.

THE HINMAN STATION METER DRUM,

The greatest advance that has been made in 20 years in the ACCURATE and ECONOMICAL measurement of gas in large quantities. :: :: ::

NEW YORK OFFICE: 561 West 47th Street. | ALBANY OFFICE: 991 Broadway. | CHICAGO OFFICE: Jefferson and Monroe Streets.

The Sprague Meter Co.

Manufacturers of

Cast Iron Gas Meters

for

Artificial or Natural Gas

Plain or Prepayment

Lower in first cost and cheaper to maintain than any meter on the market.

Write us for particulars.

The Sprague Meter Company

203 Water St., Bridgeport, Conn.

ALCOHOL, Its Manufacture from Farm Products and De-Naturing,

By F. B. WRIGHT.

A NEW AMERICAN BOOK.

CONTENTS.

Chapter 1. Alcohol, its various forms and sources.
" 2. Mashing, cooling and fermentation in general.
" 3. Distillation, simple forms of stills, the production of Alcohol from wine.
" 4. Malting.
" 5. Alcohol from Potatoes, mashing, fermentation, distillations, Continuous stills.
Chapter 6. Alcohol from Grain.
" 7. Alcohol from Beets.
" 8. Alcohol from Sorghum and Molasses.
" 9. De-natured Alcohol and its Commercial uses.
" 10. Alcoholometry. Index.

Fully Illustrated with Original Drawings of Necessary Apparatus.

PRICE, $1. For Sale by

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

NATHANIEL TUFTS METER COMPANY,

455 Commercial St., Boston, Mass.

PREPAYMENT GAS METERS,
WET AND DRY GAS METERS, STATION METERS, ETC.

REPAIRING OF ALL MAKES OF METERS, AND FITTED WITH OUR PREPAYMENT ATTACHMENT.

B
METERS.

INCREASED CAPACITY.
INCREASED EFFICIENCY.

PREPAYMENT METERS, STATION METERS, METER PROVERS, ETC.

PROMPT AND CAREFUL ATTENTION TO ALL REPAIR WORK.

MARYLAND METER COMPANY,
BALTIMORE. — CHICAGO.

YOU NEED ONE OR MORE OF OUR COMPLAINT METERS.

METERS, Plain and Prepayment,

For Artificial or Natural Gas.

Repairing All Makes and Attachments Added if Desired.

SPECIAL METERS FOR ACETYLENE.

KEYSTONE METER COMPANY,
ROYERSFORD, PA.

JUDICIOUS ECONOMY IS EFFECTED

BY USING

5-L. IMPROVED GAS METERS.

LOW SPEED, LARGE DIAPHRAGMS, STRONGER CONSTRUCTION, LARGER CAPACITY.

FITTED WITH

THE NEW YORK PREPAYMENT ATTACHMENT.
STEEL BOX AND CABINET LOCK.

NEW YORK IMPROVED METER CO., 306-310 East 47th St., New York City.

PACIFIC COAST REPRESENTATIVE: THE NORTHWEST GAS EQUIPMENT CO., Portland, Ore.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers, Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.

Gas Analyst's Manual,

By JAQUES ABADY, M. Inst. Mech. E.

(Incorporating F. W. Hartley's "Gas Analyst's Manual" and "Gas Measurement.")

Ninety-three Illustrations and Nine Folding Plates.
Bound in Handsome Half Leather. Price, - **$6.50.**

FOR SALE BY

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

JOHN J. GRIFFIN & CO.,

1513 TO 1521 RACE STREET,
PHILADELPHIA.

559 West 47th Street,
NEW YORK.

Jefferson and Monroe Streets,
CHICAGO.

GAS METERS,

Station Meters and Apparatus of Every Description.

REPAIRING CAREFULLY DONE.

THE POSITIVE PREPAYMENT METER.

OVER 600,000 OF THESE PREPAYMENT METERS ARE IN USE IN THE UNITED STATES, AND THE DEMAND IS STEADILY INCREASING.

If you have some ordinary meters to be repaired, send them to us and let us repair and convert them into prepayment meters. They will be a source of satisfaction and profit to you.

SEND FOR OUR CATALOGUE AND OUR PREPAYMENT BOOKLET.